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THE MARINE OBSERVER

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COVER PHOTOGRAPH: The latest recruit to the U.K. Voluntary Observing Fleet, P&O Cruises' new liner *Oriana*, 69,153 gross tons, outfitted with multi-channel distant-reading temperature equipment during construction at the Meyer Werft shipyard, Papenburg, Germany. H.M. The Queen is due to formally name *Oriana* at Southampton on 6 April and the ship will sail on her maiden cruise on 9 April. She is the first liner to be purpose-built for the European cruising market, and is the fastest liner to be built for a quarter of a century.

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Letters to the Editor, and books for review should be addressed to the Editor, *The Marine Observer*, Met. Office (OM), Scott Building, Eastern Road, Bracknell, Berks RG12 2PW.

LONDON: HMSO

Annual Report of the Observations (Marine) Branch for 1994

1. Voluntary Observing Fleet (VOF)

On 31 December 1994 the following numbers of merchant ships made up the United Kingdom VOF:

(a) 480 Selected Ships, making voluntary observations of the weather at sea in the full SHIP code, at specified times. To this end, they are supplied with a comprehensive set of meteorological instruments and stationery on loan for the purpose.

(b) 2 Supplementary Ships, recording marine observations on a lower level than Selected Ships, commensurate with the size of ship and observing opportunity. A smaller scale of instruments is carried.

(c) 55 MARID vessels, mainly ships engaged in the northern European coastal trades including the North Sea. Important data on sea temperature and current weather are provided by these ships, giving useful information for the forecasting of fog, and possibly of the formation of sea ice, in their areas of operation.

(d) 2 automatic light vessels, *Channel* and *Greenwich*. The latter replaced the Royal Sovereign light tower during refurbishment.

(e) 14 Auxiliary Ships, vessels which are requested to co-operate on a single observing voyage basis, using an abbreviated form for coded observations. The special forms are supplied by Port Met. Officers, particularly to ships expecting to voyage in ocean areas from which the receipt of weather data is sparse.

(f) 38 Oil Rigs and Platforms, also reporting in SHIP Code from around the North Sea and continental shelf oil fields. Offshore Advisers are established at Aberdeen Weather Centre and at Met. Office Bracknell HQ to liaise with the observers on these stations.

On recruitment Selected Ships are equipped with a precision aneroid barometer, a marine barograph, two each of dry- and wet-bulb thermometers in Stevenson screens, sea temperature thermometers and a bucket, plus all necessary publications and stationery to carry out the observing process. Certain ships are fitted with additional Met. Office instruments for distant reading of temperatures and/or automatic weather message transmission.

The World Meteorological Organization (WMO) VOS scheme of which the U.K. VOF is a part incorporates a total of approximately 7300 of the world's merchant ships.

The Port Met. Officers based at seven key port areas in the country, in liaison and with guidance from Headquarters, maintained their contacts with existing U.K. and overseas observing ships, whilst continuing to foster their important cause of the collection and dissemination of marine weather data. They continue in their efforts to recruit merchant ships willing to co-operate in the voluntary marine observing programme.

Of the 864 ships' meteorological logbooks received during 1994, 779 were sent in by ships and 85 by North Sea oil rigs or platforms. All data recorded in logs are passed through quality control before being keyed into the Marine Data Bank, in which all records received from observing ships are stored for climatological and forecasting use. Thus the extensive archive of marine observations continues to need a plentiful supply of accurate readings from ships to augment it.

Reports of meteorological, celestial and natural phenomena submitted in ships' logs were forwarded to various experts for scientific evaluation and comment. Informative commentaries for possible publication and for the information of the ship reporters is received from the Institute of Oceanographical Sciences Deacon Laboratory (IOSDL) on bioluminescence, and marine life generally from the retired member of the Dove Marine Laboratory, Cullercoats. Two officials of the Royal Naval Birdwatching Society make identifications and comment upon land- and seabirds, and the Head of the British Astronomical Association (BAA) Aurora Section provides quarterly reports for publication.

From the Institute of Meteorological Optics come scientific comments on such phenomena as mirages and haloes, and mobile cosmic phenomena are identified by the member of the BAA Artificial Satellite Section. Waterspouts and lightning are taken care of by the relevant section of the Tornado and Storm Research Organisation (TORRO). Yet other scientific organisations are occasionally called upon to provide expert analysis and comment, both for the causes of science and for the marine observers who report on their interesting sightings at sea.

Following the limited WMO observation monitoring exercise carried out over the two years to July 1990, with the co-operation of ten U.K. observing ships out of the total of 40 which participated, analysis of the results culminated in the minor changes to the WMO SHIP code introduced in November. The reporting of weather, cloud and wave groups was made mandatory and a wet-bulb temperature group added. The sea temperature group was extended in its application so as to give an indication of the sampling method used.

Air and sea temperature Distant Reading Equipment was fitted to the new P&O Cruise liner *Oriana* and to the new ferry of Caledonian MacBrayne of Scotland. On the 30 ships fitted with the Meteorological Observing System for Ships (MOSS), observers enter their observations against VDU prompts, before the complete weather message is transferred to a Data Collection Platform for automatic transmission via geo-stationary meteorological satellite to a national Met. Service on its way to Bracknell. Although problems have been experienced with sections of the MOSS equipment, it continues to give worthwhile service of value to shipboard observers.

After ten years of operations on U.K. ships, the Met. Office involvement in the Automated Shipboard Aerological Programme (ASAP) came to an end for economic reasons. Following trials first held in 1984, VOF ships were involved in regular soundings of the upper atmosphere. In April the special 20-ft containerised unit was landed from *CanMar Europe* at Montreal for return to the Canadian Met. Service base at Vancouver, from whence it had been on loan.

From 1987 onwards, two radio sonde launches were made daily, timed at 0000 and 1200 UTC, augmented by additional ascents when requested by the Met. Office. Upper air data were transmitted automatically to Bracknell. The ASAP units, in operation on two ships for most of the period, were each manned initially by one Met. Office Scientific Officer who also assisted with the collection of the six- or three-hourly surface observations. From 1991 onwards the ASAP operations were conducted by contract staff of Marr Vessel Management of Hull.

ASAP operations continue to be maintained on merchant ships by the Met. Services of some other European countries, and the Met. Office also undertakes the provisioning of the unit installed on R.R.S. *Bransfield* for monitoring the upper atmosphere on the research ship's passage to and from Antarctica.

Of the large number of buoys equipped with Automatic Weather Stations deployed over the oceans, the U.K. has seven moored buoys deployed to the west of the country, and has about 14 of the EGOS drifting buoys deployed in the North Atlantic: the drifters report through the French ARGOS communications system.

2. Ocean Weather Ship

Despite threats to its survival on cost-cutting grounds, the Met. Office continued Ocean Weather Ship operations throughout the year, the future of *Cumulus* being secure for the immediate future. Commercially operated and manned by Marr's on behalf of the Met. Office since the 'purchase' in 1985 of the purpose-built ship for £1 from KNMI, the Royal Netherlands Met. Institute, the weather ship continued her regular forays into the North Atlantic from her home port of Greenock with a normal complement for her size and 'trade', plus four meteorological staff. With one- or two-day turns-round for crew change and re-storing, the ship's schedule was successfully adhered to, apart from four occasions when the ship had to steam to convenient locations from which sick or injured crew members could be evacuated by helicopter or landed at a convenient port.

The remainder of each five-week voyage was spent steaming to and from the chosen station and maintaining a comprehensive meteorological and oceanographical work programme out at sea, with the exception of the ten-day period set aside for annual drydocking, stemmed at Milford Haven. Whilst the ship was in dry dock, independent surveys were carried out by both Department of Transport and Bureau Veritas surveyors, who reported favourably on the condition and equipment of the weather ship. Following the completion of minor repairs and hull painting, an inspection was made by a KNMI representative for the ship's original mentors, whose report indicated satisfaction with the condition and appearance of the ship, stating that with similar standards of maintenance the ship could be operated for several more years.

Initially deployed to former WMO North Atlantic Ocean Station 'Lima' in 57°N, 20°W, from March onwards the policy changed to position the ship near latitude 52°N in similar longitude, a location preferred by computer modellers and synoptic meteorologists. Hourly surface and 6-hourly radiosonde upper air observations were carried out daily.

A variation to the new position of deployment took place in April, when *Cumulus* was despatched firstly to Milford Haven to embark two scientists, one for the Defence Research Agency (DRA) Farnborough, the other from GEC Marconi Research. The ship was then sent to a position around 47°N, 20°W to take part in a ten-day exercise with the U.S. NASA Shuttle Planet Earth Mission, making inter-comparisons between shuttle and ship of measured sea wave data. Analysis and publication of the results is awaited at the time of going to press, but the co-operation of all on board the weather ship was highly commended by the scientists taking part.

Since 1948, all U.K. Ocean Weather Ships have co-operated in the sampling of sea surface temperature and salinity on behalf of the Fisheries Research Laboratory of the Ministry of Agriculture, Fisheries and Food (MAFF), based at Lowestoft in Suffolk. The 1994 Fisheries Research Data Report No.36 shows that in the four converted *Flower* class corvettes, which made up the first U.K. Ocean Weather Ship service from 1948 onwards, the Lumby surface sampler was used, in which thermometer and sample bottle were immersed together and towed for a minimum period of five minutes per sampling in the upper few metres of the sea.

After 1956, weather ships were fitted with samplers which came off the engine room intakes at about 4 m depth, similar to those installed on *Cumulus* today, with salinity determination of the samples being carried out at the MAFF Laboratory using the 'Autosal' salinometer. From this research, MAFF produces decadal and 30-year mean monthly temperature and salinity tables, including standard deviations. Latest results show that, apart from seasonal fluctuations, there has been little variation in either sea surface temperatures or salinities over the last 45 years.

Plankton sampling on passage to and from station continued using the Plankton Recorder towed on behalf of the Sir Alister Hardy Foundation for Ocean Science, Plymouth. For the Institute of Oceanographic Sciences Deacon Laboratory, Wormley, Surrey, wave measurements were regularly recorded, and 6-hourly bathythermograph soundings made on behalf of the Hydrographic Office, Taunton. Other continuing co-operative projects included sampling of the bird population for the Royal Naval Birdwatching Society, records of cetacean sightings for the Oxford & Cambridge Census Group, aurora for the British Astronomical Association Aurora Section and the measurement of solar turbidity by sun photometer for the Met. Office Observation Provision branch. On two separate voyages, the opportunity was taken to call at Reykjavik to make further deliveries of drifting buoys fitted with Automatic Weather Stations on behalf of the Iceland Met. Service.

3. International and domestic activities

In April the Marine Superintendent, Captain Gordon Mackie, and his Deputy manned the Met. Office mobile exhibition unit at the Safety at Sea and Marine Electronics Exhibition (SASMEX), held at Earls Court International Hotel, London. Due to shortage of covered space, three days of strong wind chill conditions existed around the entrance stand allocated, but the display of Met. Office Marine Commercial Services, including METROUTE, the Office Ship Routeing Service, and highlights of the VOF, was deemed a success.

The Marine Superintendent also attended a number of international and national meetings during the year. He was in Geneva in April at the WMO headquarters as Vice Chairman of the ASAP Co-ordinating Committee, which discussed the future of radiosonde operations on merchant ships. In May Captain Mackie journeyed to San Antonio, Texas, to attend the Annual Assembly of the Radio Technical Commission for Maritime Services as Moderator (Chairman) for the session dealing with weather related matters. He returned to WMO Geneva in June for an Integrated Global Ocean Services (IGOSS) meeting, called in connection with the Global Temperature and Salinity Pilot Project. The aim of the project is to expand the operational availability of surface and sub-surface sea temperature and salinity data and its attendant management systems.

On his return to Geneva in August, the Marine Superintendent sat as Vice Chairman on the Co-ordinating Group for COSNA (Composite Observing System for the North Atlantic), attended by the nine countries with an interest in this project. COSNA is important to the Global Observing System as a whole and stress was placed on the need for high-quality data from the Atlantic (and other data-sparse areas). Discussion was held on the priorities concerning effective design of the operational programmes for the systems becoming available in the coming two or three years.

The systems considered included the VOF (where it was felt that more

motivation and education of ships' staff was needed to encourage marine observing with the modern aids of automation and satellite communication), buoys, both moored and drifting, satellites, ASAP and ASDAR (Aircraft to Satellite Data Relay). Over the previous ten years of its operation, ASAP had proved a cost effective way of obtaining high quality upper air data from the oceans. The number of operational units had dropped from a maximum of 15 in 1991 to 11 at the present time, but both Sweden and the United States expected to deploy up to five further units in coming years, in the Pacific, Indian and Atlantic Oceans.

In December the Marine Superintendent was called upon to present a paper on the progress with GMDSS at the Mauritius meeting of the WMO Committee of Marine Meteorology's Advisory Working Group.

Also during the year, one day meetings were held in Oslo on the ASAP installation on the Ekofisk oil platform, and with KNMI at their Netherlands headquarters on the possible installation on VOF ships equipped with INMARSAT-C of their TURBO1 software programme. This programme enables the coding and transmission of SHIP reports. KNMI have reached an agreement with WMO to supply and maintain TURBO1 software used on any VOF ships. Trials of the programme are in progress on a P&O Containers observing ship. In October, Captain Mackie gave a talk in the Sir John Houghton Lecture Theatre at Bracknell headquarters on *Marine Meteorological Communications*, as part of a seminar organised by the Historical Group of the Royal Meteorological Society.

The Marine Superintendent's commitments at International Maritime Organization headquarters in London continued as the WMO Representative to IMO, and included attendance at the Safety of Navigation Committee in September, when subjects discussed included WMO matters relating to sea ice, revision of Chapter V, Regulation 4 of the Safety of Life at Sea Convention (SOLAS), and the enhancement of the VOS scheme. He also attended the 64th Session of the IMO Marine Safety Committee.

4. Publications

Revision of Met.O.887, the 1977 edition of the *Marine Observer's Handbook*, was finally completed with a view to publication in the first half of 1995 and distribution to the VOF.

To coincide with the changes to SHIP code introduced in November, Metform 911A was extensively revised and updated, publication being expected in early 1995. Until the new log comes on stream, with clear indication on the front cover that it contains the code changes, observers are asked to continue to use the special stick-on labels on copies of earlier editions of the log, as guidance in use of the new and altered code groups.

The quarterly editions of this journal were published on schedule in January, April, July and October, with two-thirds of the print run distributed to voluntary observing ships and their operators and other marine interests, the remainder being available for sale to subscribers in any country. In the final edition of the year, a Survey form was included in 30% of externally distributed copies, the first of its kind aimed at gathering readers' views and suggestions for analysis and possible action by the Editors.

5. General

Four shipmasters with lengthy and distinguished observing careers were

honoured with presentations of inscribed barographs, arranged in two separate ceremonies held in Bracknell in June and July.

Rewards to a total of 300 Masters, Principal Observers and Radio Officers for their top class weather observing and transmission work during the year, took the form of books presented as Excellent Awards. *Cassell's Concise English Dictionary* (1993), *Philip's World Atlas and Gazetteer* (1994) and *The Oceans - A Celebration* compiled by the Living Earth Foundation and reviewed in *The Marine Observer* last July, were the books selected for presentation.

Many Excellent Award books still await claimants from several years. Nominees are notified by letter in May or August each year and their names published in the July or October editions of *The Marine Observer.* Efforts are frequently made to trace recipients with the help of their employers, but often without success. Back numbers of the journal should be consulted by any officers believing they may have been nominated for an award in the past.

Station reports in the bulletins broadcast for inshore waters by the BBC were amended in April when Scottish stations Machrihanish and Greenock replaced Prestwick, Corsewall Point and Orlock Head which could no longer sustain the observational pattern required. For the coastal shipping bulletins, Greenwich light vessel automatic replaced the Royal Sovereign in May, when the light in the latter was automated and the station demanned under Trinity House modernisation plans.

In October a party of 15 Master's Certificate students and lecturers from the Navigation School at Marstal, Denmark, were conducted around the Central Forecasting and Telecommunications Offices, as part of a week's tour visiting places of educational interest in and around London.

Commercial Services — Marine Operations in 1994

The Marine Weather Group (MWG) was formally launched as a new Business Unit of the Met. Office in January 1994. The Group brought together into a single unit the various specialist marine services, most of which have been in existence for many years, originally directly under the aegis of the Marine Superintendent, who retains responsibility for advice to the Chief Executive on professional marine matters.

The Marine Weather Group encompasses the specialist services of METROUTE and the Marine Advisory and Consultancy Service at Bracknell (see below), Offshore services at Aberdeen and Singapore and a selection of other dedicated services to a variety of marine customers, such as the fishing industry, ferry companies, and ports and harbours. The latter services are provided both from Bracknell and from local forecast offices within the U.K.

6. METROUTE

The ship routeing services of METROUTE have seen increased activity, with owners and charterers recognising the value of sound meteorological and marine advice which is provided by the experienced Master Mariners in the METROUTE team, and which contributes significantly to day-to-day operations of the service.

The METROUTE team is located in the Central Forecasting Office at Bracknell Headquarters, and thus has immediate access to the global analyses and forecasts as they are produced. All advice is prepared individually for each ship and for each

voyage, bearing in mind the constraints and requirements in marine operations, such as the need to avoid excessive motions in a seaway, and (more importantly) to conserve fuel.

In addition to voyage routeing, METROUTE also supplies Tropical Storm Advisories, as well as specialised forecasts for marine activities such as towing, surveying and the leisure market of ocean yachts, where the watchword is 'weather to advise, whether to sail'. In addition, post-voyage analyses can be provided on request. METROUTE also works closely with the Marine Advisory and Consultancy Service when required to input a nautical background into enquiries involving marine legal and insurance matters.

7. Marine Advisory and Consultancy Service

Questions relating to any aspect of past weather at sea are handled by the Marine Advisory Service, a specialist unit of the Commercial Services Division. The unit has access to extensive computer databanks containing weather observations made over all the oceans, and these data can be analysed and presented in a wide variety of formats to meet the needs of engineers, planners, designers and others.

For example, Sea Transport interests concerned with, say, the introduction of a new type of vessel will wish to know the range of wind and wave conditions which must be expected over the routes being planned. Similarly, the Offshore Industry is concerned with likely 'downtime' due to adverse weather which could disrupt production of oil or gas in a new location. Also, coastal engineering consultants or contractors may wish to know the expected frequency of strong winds or high waves for new construction work. For legal and insurance interests, advice is regularly provided on weather conditions which may have been responsible for incidents at sea resulting in loss of vessel or cargo.

All these problems are addressed using the extensive data and expertise accumulated, which are available from the Marine Advisory Service.

April, May, June

The Marine Observers' Log is a quarterly selection of observations of interest and value. The observations are derived from the logbooks of marine observers and from individual manuscripts. Responsibility for each observation rests with the contributor. All temperatures are Celsius unless otherwise stated. The standard international unit for barometric pressure is the hectopascal (hPa) which is numerically equivalent to the millibar (mb).

PASSAGE OF DEPRESSION

Foveaux Strait

m.v. *Moreton Bay*. Captain G.J.H. Peaston. Port Chalmers to Melbourne. Observers: the Master and ship's company.

19–22 April 1994. The vessel was alongside at Port Chalmers while the barograph trace had shown a steady fall giving a clear indication of an approaching storm. The vessel sailed at 2200 UTC on the 19th and, after disembarking the Pilot, set course to the south; at this time the wind was NE'ly, force 5, the pressure was 984.0 mb and the sea was moderate with a short moderate swell.

By 0600 on the 20th the vessel was transitting the Foveaux Strait and the wind had increased to W×S'ly, force 7; the pressure had fallen to its lowest recorded reading of 973.9 mb at 0400, and by 0600 it had risen to 981.2 mb. The vessel was beginning to pitch heavily to a high sea and an average moderate to heavy swell. The following observations for the 20th have been taken from the ship's logbook.

Time	Wind Dir'n	Force	Dry bulb	Pressure	State of Sea/Swell	Remarks
0000	NE	4/5	15.3°	984.2	Mod./Mod.	Pitching moderately. Overcast, fine.
0100	NNW	7/8	—	983.9	Rough/Mod.	Pitching moderately. Cloud 6 oktas. Rain showers.
0300	NW	6	—	978.9	Rough/Mod.	Pitching moderately. Cloud 6 oktas. Rainshowers.
0400	NNW	7/8	13.8°	973.9	Rough/Mod.	Minimum pressure reached.

0600	W×S	7	—	981.2	V.rough/Mod.	Pitching moderately.Overcast with squally rain showers.
0800	WSW	8	8.6°	987.2	High/Heavy	Pitching heavily at imes. Overcast with squally rain showers.
1200	SW	7	7.0°	993.3	High/Heavy	Overcast with squally rain showers and occasional hail showers.
1400	SW×S	7	—	993.9	V.rough/Heavy	Rolling and pitching heavily at times. Overcast with frequent moderate rain showers.
1800	WSW	6	—	997.3	Rough/Heavy	Rolling and pitching heavily at times. Overcast with frequent squally rain showers.
2000	SW×S	7	7.5°	1001.4	Rough/Heavy	Rolling and pitching heavily at times. Overcast with frequent squally rain showers.

At 0750 on the 20th the ship's speed was reduced and further reduced at 0837 in order to ease the pitching motion. At 1200 course was altered to 305° and to 330° at 1400 in order to put as much distance between the vessel and the worst of the weather. At this time the centre of the depression was located at 48°S 160°E and was moving east at 40 knots.

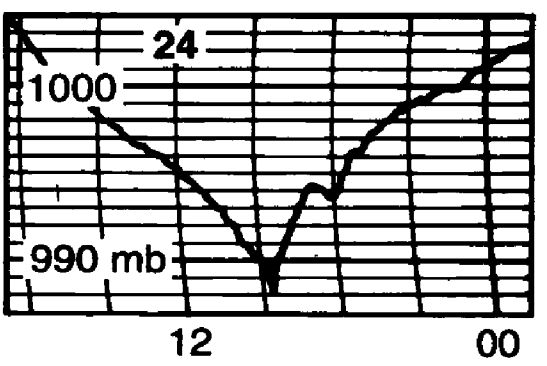
Although the pressure and later the temperature began to rise on the 21st, the sea state remained similar throughout the day. The first visual signs of the weather moderating were observed at 0500 when the wind began to ease despite a persistent average heavy swell. At this time course was altered to 310° and progressively during the next 18 hours to follow a more westerly heading. By 1300 the pressure had risen to 1013.4 mb and the wind was W×S'ly, force 6; it continued to back and by 0000 on the 22nd was SW'ly, force 5 while the pressure was 1021.2 mb and the sea state was rough with an average moderate swell.

Position of ship: approximately 46° 30'S, 168° 00'E.

PASSAGE OF FRONT
North Atlantic Ocean

m.v. *Jostelle*. Captain N. Kelly. Port Cartier to Hamburg. Observers: the Master, Mr C. MacSweeney, 2nd Officer and members of ship's company.

24 April 1994. At 1430 UTC whilst on a course of 075° at 12.5 knots a heavy line of rain could be seen both visually astern of the vessel and also on the 10 cm radar; it was noticed to be closing rapidly with the vessel. The wind strength had been increasing all morning and veering to SW'ly whilst rain and drizzle had been continuous since early morning.



By 1500 it was raining heavily accompanied by strong gusts of wind in excess of force 9 at times and zero visibility. Shortly afterwards the pressure started to rise rapidly, as can be seen on the barograph trace, as the front cleared the vessel moving east-north-easterly while the wind veered to W'ly. At around 1700 the rain had stopped and the sky was brightening astern, the wind was now W'ly, force 8 but the pressure was steady. About an hour later the pressure started to rise again but at a slower rate.

The heavy rain and strong gusts lasted for about 15 minutes and the lowest pressure reading was 990.1 mb (corrected).

Position of ship: 43° 12'N, 38° 06'W.

LINE SQUALL

Indian Ocean

m.v. *Welsh Venture*. Captain M.C. Roberts. Shimotsu to Fujairah. Observers: the Master and ship's company.

22 May 1994. A line of very heavy rain lying south-south-west to north-north-east had been noted on radar approaching, and at 0718 UTC the vessel entered an area of torrential rain showers. Within the rain the visibility dropped to about 200 m at best, the ship's foremast was lost from view and the forward fog signal sounded rather poor owing to the amount of water building up inside the horn between each blast. The photograph shows the 'view' within the rain, taken through a clear screen.

Photo. by Captain M.C. Roberts

During the passage of the rain the wind veered SW'ly and there were gusts of about 30 knots while the air temperature decreased from 27.8° to 24.5°. At 0727 the rain had cleared the vessel and the visibility then rapidly improved.

Position of ship: 05° 48'N, 86° 06'E.

CORPOSANTS

Strait of Malacca

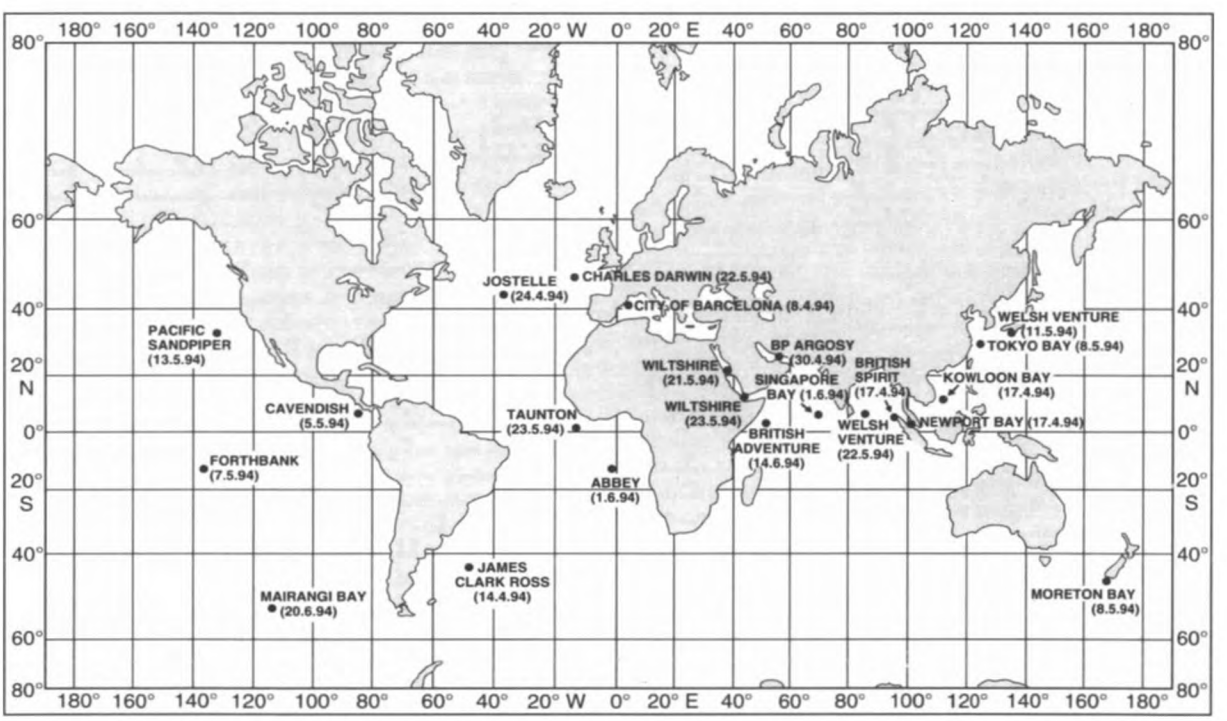
m.v. *Newport Bay*. Captain A.C. McCulloch. Singapore to Suez. Observers: Mr D.L. Dodsworth, 2nd Officer and Mr A.R. Thorne, SM1.

17 April 1994. At about 1640 UTC the ship was experiencing almost continuous lightning, the flashes often being only 0.5 second apart. At 1840 a bright blue/purple glow was seen on the forward corner of the bridge-wing taffrail. On closer inspection it was discovered to be electrostatic discharge into the surrounding air. When the lookout raised his hand into the undisturbed atmosphere beyond the taffrail the discharge increased and was clearly visible extending 3–4 cm from the tip of each finger in a similar blue/purple, almost flame-like pattern; at the same time a crackling or buzzing sound was very clearly audible. This phenomenon continued for almost an hour, much to the amusement of the observers.

Little thunder was heard throughout the period and by 1925 the lightning frequency was decreasing rapidly along with the static discharge which faded until non-existent. No glows were observed anywhere else on the vessel or its aerials.

Weather conditions at the time were: air temperature 28.8°, wet bulb 24.8°, sea 30.4°, pressure 1009.9 mb, wind variable, force 1–2. The sky was completely overcast with frequent lightning.

Position of ship: 03° 48′N, 99° 50′E.



Position of ships whose reports appear in *The Marine Observers' Log*

CURRENT

Indian ocean

m.v. *British Adventure*. Captain A.K. Birley. Yanbu to Salvador. Observers: the Master, Mr R. Miller, 2nd Officer and Mr P. Clemence, Radio Electronics Officer.

14 June 1994. At 1045 UTC while on a course of 205° at 12 knots a prominent tide rip was observed ahead of the vessel. North of the tide rip the sea appeared blue with many 'white horses', the wind being SW'ly, force 6; a south-westerly swell of approximately 2.5 m was also present. The tide rip itself was marked by confused waters south of which the sea appeared to be greenish in colour with far fewer white horses; here, there was a smaller but confused swell.

The sea temperature was noted just prior to crossing the rip and was found to be 28.0° as read from the sea-water cooling system readout on the bridge. As soon as the ship's bow crossed the rip, the ship's head took an immediate and quite violent swing to port. With 20° starboard helm applied, the ship's head steadied at 175° having completed a 30° swing to port. Immediately upon crossing the rip, the sea temperature was again noted and was found to have fallen to 25.0°; it fell further to 23.0° within 0.5 n. mile of the rip.

The radar showed the rip to be readily apparent once the vessel was to the south of it, showing it to lie 120°/300° but it had been much less apparent from the north. A weak, uneven return from depths of 60–80 m was recorded south of the rip whereas the actual depth of the seabed was approximately 4000 m.

It was calculated that on crossing the tide rip, the vessel had experienced an easterly setting current of 6 knots, and this was confirmed by GPS positions. Over the following four hours the vessel experienced a current setting 135° at a rate of 3.6 knots. Strong easterly currents had been observed the previous day between positions 08° 50′N, 52° 30′E and 07° 20′N, 52° 30′E but the current had decreased virtually to zero before the tide rip was encountered.

Position of ship: 04° 16′N, 50° 44′E.

South Atlantic Ocean

R.R.S. *James Clark Ross*. Captain N.A. Beer. Grytviken to Montevideo. Observer: Mr S. Wallace, 3rd Officer.

14 April 1994. During the passage the speed being made was less than would be expected with the power settings and weather conditions at the time (the wind was W'ly, force 7 at 1500 UTC), and the vessel was applying leeway to counteract the effects of wind and swell approximately 5 points off the port bow. In addition, the sea temperature was rising, being noted as 13.0° at 1100, 15.0° at 1500, 17.8° at 1800 and 18.9° at 1900.

Upon consulting *Ocean Passages for the World*, the *South America Pilot* (*Volume I*) and British Admiralty Charts all with particular reference to the Brazil Current, it was noted that the current extends to the latitude of the River Plate where it interacts with the cold Falklands Current, fanning out from its left flank into the open ocean and leading to a belt of easterly sets between 30° and 40°. *Ocean Passages for the World* described the Falklands Current as a north-flowing, cold current and stated that, 'There are indications of marked eddies associated with patches of warm water penetrating well south in longitudes 50°–55°W from the south part of the Brazil Current'. From the information recorded it was

considered that the vessel was being affected by such an eddy despite being further east than 50°W at the initial observation. The sea temperature remained high for the duration of the passage to Montevideo.

The photograph shows an image of a NOAA–11 satellite picture received at 0727 on the 14th and clearly shows the weather system affecting the vessel.

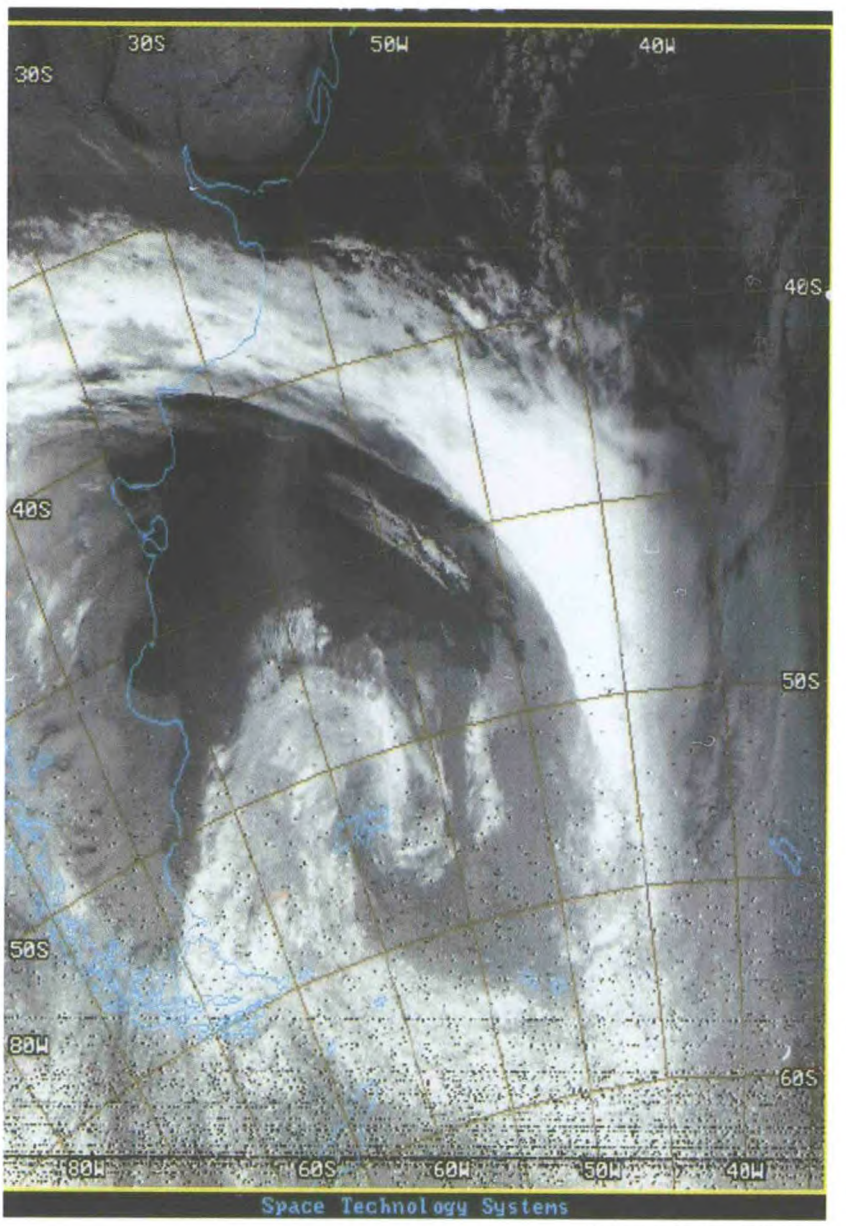


Photo. supplied by S. Wallace

NOAA–11 satellite image received on board the *James Clark Ross* on 14 April 1994

Although the colours and intensities could only be altered on the received picture the image also shows a dark shade running along the coast and reappearing south of the band of cloud. It was thought that the shading may have represented the warmer water of the Brazil Current.

Position of ship at 1500 UTC: 42° 53′S, 48° 29′W.

SCENE AT SEA

Photo. by V.A. McAdam

Flare induced cloud above the Tiffany oil platform on 2 June 1994. Photographed from the *Seillean* while on location at the Donovan Oilfield (58° 22.7′N, 00° 52.7′E).

Photo. by J. Pinchin

Peregrine Falcon on board the *Cavendish*. (See page 66.)

Photo. by G.J. Simpson

Kestrel on board the *Wiltshire*. (See page 66.)

CETACEA

Indian Ocean

m.v. *British Spirit*. Captain M. Pocklington. Singapore to Fujairah. Observers: Mr J. Tyson, 2nd Officer, Mr D. Nowakowski, 3rd Officer and Mr R. Webster, Electrician.

1 April 1994. As the vessel was passing the island of Pulau We at 0500 UTC the observers noticed several 'blow sprays' on the starboard bow and observed the dorsal fins of Killer Whales. On closer inspection with binoculars it was decided that the blows must have been those of the whole family. The whales passed down the starboard side of the vessel approximately 2 cables off, continuing to dive and surface at regular intervals while not altering their course or seeming perturbed by the vessel as it passed them. The ship's course was 269° at 15 knots.

A total of four whales were noted and the markings of the Orca could be clearly seen, leaving the observers in no doubt as to the species. Their passage along the ship lasted 10–12 minutes before the pod fell behind, still surfacing and diving. The sea was calm and clear, there were slight airs with clear skies and the whole sighting was very calming and graceful to watch.

Position of ship: 06° 00′N, 95° 15′E.

BIRDS

North Atlantic Ocean

R.R.S. *Charles Darwin*. Captain R. Bourne. Research cruise in Western Approaches. Observer: Mr P. Burridge, 2nd Officer and members of ship's company.

22 May 1994. At 0800 UTC a bird of prey was spotted at the forward masthead, perching with its back to the bridge so making identification difficult. It appeared to be somewhat fatigued and took time rearranging a few ruffled feathers. Following an unobserved flight, it was next seen at the mainmast head and displayed the typically spotted Peregrine Falcon breast and 'plus four' style feathered legs. It was surmised that this may have been a young bird blown off course from southern Ireland by the NE'ly gales.

After initial disagreement upon its fate and whether it would take food, it was decided to leave the bird to fend for itself; the ship had collected about six swallows and martins plus a warbler of sorts owing to the same weather conditions, and these would eventually fall prey to the Peregrine as its needs dictated. For the time being it appeared content to rest and practice its stares on the Second Officer.

By 0912 the Peregrine appeared to be concerned by the amount of interest it had elicited from the ship's complement; one second it was sitting at the masthead, the next it was gone although its departure was not witnessed by the bridge personnel. The winds were still NE'ly but light (with the prospect of cyclonic variation to come in the next few days) so the observers wished it good luck for the journey back to more familiar surroundings.

Position of ship: 48° 57.5′N, 13° 43.4′W.

North Pacific Ocean

m.v. *Cavendish*. Captain J.O. Jubb. Panama to Singapore. Observers: the Master, Mr J.Pinchin, Chief Engineer Officer and ship's company.

5–8 May 1994. Shortly after clearing the Pacific side of the Panama Canal, while steaming along the coast of Costa Rica, the vessel was joined by a fully grown Peregrine Falcon. The bird quickly adopted the midship stowed gangway and the spare anchor forward as its perch. It was very nervous and difficult to approach but on looking through binoculars the observers could see that it had perfect plumage. The photograph [on page 64] was taken by the Chief Engineer who sat by the spare anchor and 'snapped' the bird as it landed after a flight.

During its first day with the ship, the bird flew around a great deal, leaving its perch at the first sign of human movement. On the evening of the 5th, strips of red meat were laid out on the gangway; after about an hour spent inspecting it, the falcon overcame its nervousness and ate the meat. At the time it was intended to make the meat a daily ritual but during the 6th and 7th the falcon frequently flew off, returning shortly with a small seabird in its claws and quickly devouring it, so no more meat was put out.

The falcon stayed with the vessel for 3 days, a steaming distance of 1200 n.mile but on the morning of the 8th as the vessel was clearing the coast, it left. The observers could not but wonder if the falcon caught an eastbound ship back to Panama.

Position of ship: 08° 00′N, 88° 00′W.

Red Sea

m.v. *Wiltshire*. Captain F.R.F. Martin. Aqaba to Sitra. Observers: the Master, Mr A.B. Fleming, 3rd Officer, Mr G.J. Simpson, Radio Officer and members of ship's company.

23 May 1994. At 1030 UTC the bird in the photograph [on page 64] was observed flying around the vessel on numerous occasions before landing on the foremast. After a short stay (pardon the pun) on the foremast it progressed aft and landed on the starboard lifeboat davits where the picture was taken.

It was suggested that this bird was a member of the Kestrel family, although it was not possible to confirm this as there were no reference books of this nature on board. The bird seemed quite willing to pose for the photographer and did not seem to be distressed by the amount of attention it was receiving.

After about 20 minutes the bird flew off in an easterly direction. The vessel was just north of Bab al Mandab and the dry-bulb temperature was 30° on a calm day.

Position of ship: 12° 25′N, 44° 30′E.

Note 1. Mr Simpson's photograph was taken with a Canon EOS 10000FN using a 100–300 mm lens.

Note 2. Commander M.B. Casement, O.B.E., of the Royal Naval Birdwatching Society, comments:

'This is clearly a European Kestrel (*Falco Tinnunculus*), adult female. This species is common throughout Europe and the Middle East, and regularly migrates across the Mediterranean to North Africa. It is frequently reported aboard ships in the Mediterranean, off west Africa and the Red Sea, often catching and eating small birds. I have myself seen them in the central Mediterranean catching and eating small birds, on the wing — in-flight refuelling!'

North Pacific Ocean

m.v. *Pacific Sandpiper*. Captain M.J. Stares. Japan to Europe. Observers: the Master and Deck Officers.

13 May 1994. At about 0100 UTC a small number of Laysan Albatrosses were flying around the vessel before two of them landed on No. 2 hatch, see photographs. The pair remained quite happily for an hour or so during which time various acts of courtship were displayed in conjunction with excessive beak noises and 'love play'.

Photos. by Captain M.J. Stares

It was also noticed that both birds had been ringed. According to *Oceans of Birds*, by Tony Soper, it is an unusual occurrence for albatrosses to land on ships.

Position of ship: 35° 06′N, 132° 22′W.

Note. Captain P.W. Chilman, of the Royal Naval Birdwatching Society, comments:

'The courtship ritual sounds similar to that of the Southern Ocean albatrosses, it is rarely seen on board ship although there have been occasional reports. In the area of the reports the birds would almost certainly have been either Black-footed or Laysan Albatrosses, both of which nest in the Hawaiian chain and disperse widely over the Pacific.'

Editor's note. We have received only one other record of similar albatross behaviour; the *Wellington Star* proved a suitable courting site for two Laysan Albatrosses on 10 February 1987 when the ship was in position 34° 00′N, 134° 00′W, only 85 n.mile from the *Pacific Sandpiper*'s position.

Indian Ocean

m.v. *Singapore Bay*. Captain J.G.W. Dixon. Jeddah to Port Klang. Observers: Mr M.L. Mullins, 3rd Officer, Mr C.D. Mercer, (Senior Seaman) and members of ship's company.

1 June 1994. During the morning while the ship was 160 n.mile west of Minicoy, a small brown bird was discovered on a deck of the accommodation. The bird was encouraged to move but simply flapped around for a short while before settling down again. Subsequently, the bird was scooped up into the hollow of a folded towel and placed in the shelter of the bridge wing.

Being just small enough to settle in cupped hands, the bird had black-and-white markings and a black, 'hooked' bill; whilst sitting, its wing feathers crossed over its back. The passenger was thought to be an exhausted storm petrel. After resting, the bird perked up throughout the afternoon and was released in the evening, flying away strongly.

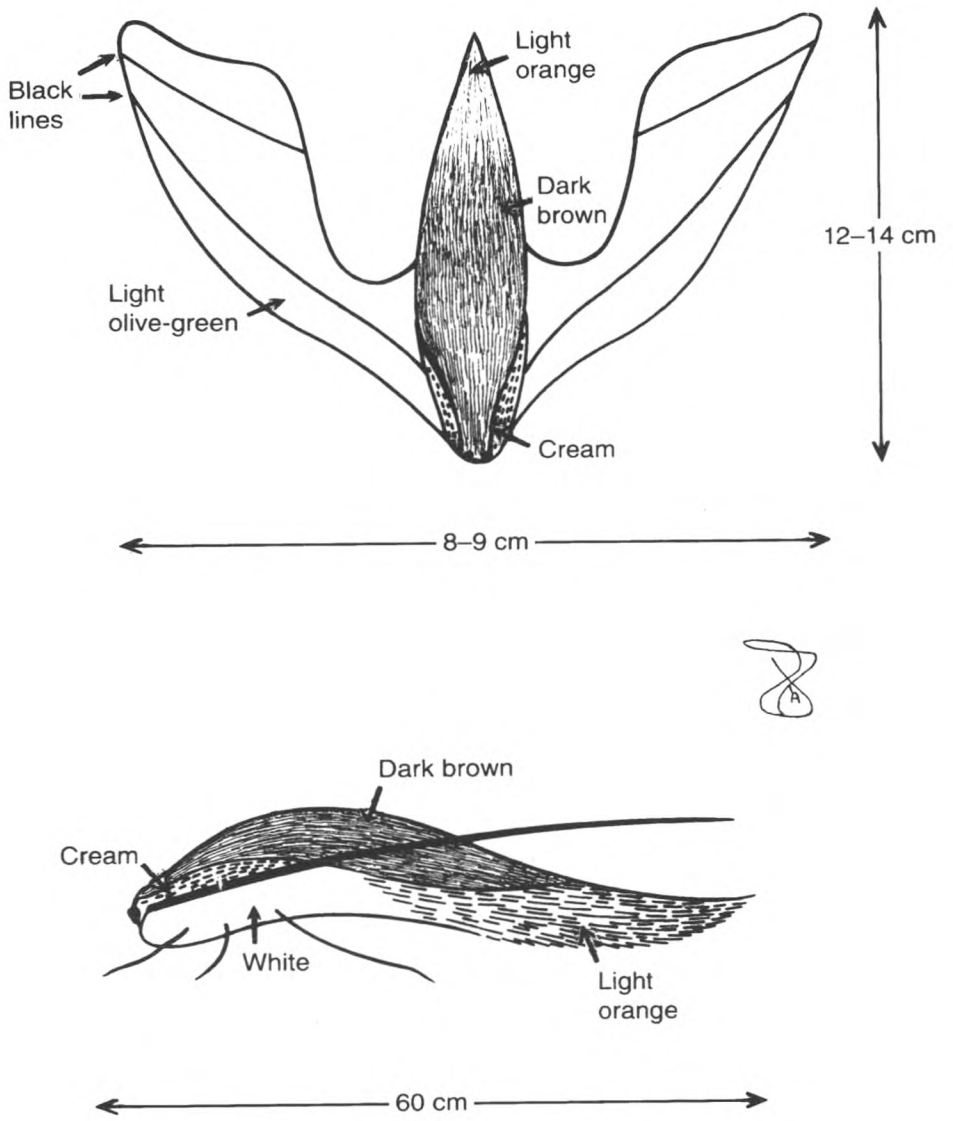
Position of ship: 08° 45′N, 70° 15′E.

INSECTS

South Atlantic Ocean

m.v. *Abbey*. Captain I.B. Middleton. Saldanha Bay to Port Talbot. Observer: Mr D.J. Ayling, 2nd Officer

1 June 1994. During the afternoon, the moth shown in the sketch was found resting in the shade on the bridge wing.



It was 12–14 cm long with a wing-span of 8–9 cm and its wings were a light olive-green colour with two thin black stripes on each one. The upper side of the body was dark-brown whereas the underside was a light-orange colour for two-thirds of its length from the tail, becoming white for the remainder; on either side of the head there was a distinct cream-coloured patch. Small black eyes were noted but no antennae were observed.

The nearest land was St Helena Island 400 n.mile to the west while Africa was some 720 n.mile east. The wind was SE'ly, force 3 and the moth was not seen the following day.

Position of ship: 12° 03′S, 00° 12′W.

BIOLUMINESCENCE

Strait of Hormuz

m.v. *BP Argosy*. Captain M.M. Watson. Kaohsiung to Jubail. Observers: the Master and ship's company.

30 April 1994. At around 1710 UTC large but faint whitish patches of bioluminescence were observed on the port side of the vessel; they were fast-moving with random directions of movement. Over the next five minutes the intensity of the bioluminescence increased to patches of brilliant flourescent green while the random pattern of movement suddenly changed to fast-moving parallel bands heading towards the vessel. The pattern then changed again to form numerous rotating spirals; some were confirmed to be rotating anti-clockwise but it was difficult to assess owing to the large number of overlapping patterns.

At this point the vessel was surrounded by the phenomena to a distance of approximately 1 n.mile radius. Yet again the patterns changed, this time to parallel concentric circles moving outwards from numerous centres. The display started to decrease at 1725, returning to milky-white patches before eventually disappearing at 1730.

Position of ship: 26° 37'N, 56° 30'E.

Equatorial Atlantic

m.v. *Taunton*. Captain G. Nicholls. Tenerife to Richards Bay. Observer: Mr J.E. Sinott, Chief Officer.

23 May 1994. At 0550 UTC the vessel was passing through an area of thunderstorms with moderate to heavy rain and the nearest area of lightning was about 4 n.mile away when the Chief Officer went onto the bridge wing to observe some bioluminescence. At this point he noted that the hairs of his arms and moustache were glowing with a bluish light although no tingling or any other sensation was felt. A check of the vessel's aerials revealed no traces of 'St Elmo's fire' and the observer appeared to be the only object affected. The glow disappeared once he retreated to the wheel-house but reformed when he went outside again but without the same intensity.

What was noticeable was that the bioluminescence was only seen at the same time as the St Elmo's fire, and the observer was left wondering whether it appeared in response to a heavy static charge in the air. No samples were taken as he was reluctant to remain on the bridge wing in case lightning struck; no more bioluminescence was seen during the watch.

Owing to heavy cloud the sky was pitch black except for sheet lightning, there was light rain and the wind was SE'ly, force 4.

Position of ship: 02° 08'N, 11° 54'W.

DISCOLOURED WATER

East China Sea

m.v. *Tokyo Bay*. Captain D.S. Hughan. Hong Kong to Busan. Observers: the Master, Mr R.K. Jones, 3rd Officer, Mr D.R. Cropley, Deck Cadet and ship's company.

8 May 1994. At 2300 UTC whilst on passage about 60 n.mile off the coast of China the vessel passed through an area of water where strong colouration was

noted. This effect lasted for about six hours during which time the vessel covered over 120 n.mile. The affected patches of the sea surface were a very bright pink/red colour, see photograph on page 64, and tended to run in a north-west to south-east direction; they were highly concentrated in some areas. Unsuccessful attempts were made to take a water sample.

On referring to the *Marine Observer's Handbook*, the observers concluded that the phenomenon was caused by dense concentrations of plankton although there was no mention of it in the vessel's area.

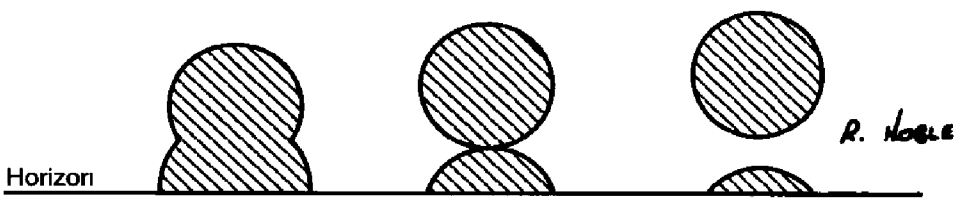
Position of ship: 30° 20'N, 124° 50'E.

ABNORMAL REFRACTION

Mediterranean Sea

m.v. *City of Barcelona*. Captain P. Bishop. At anchor off Barcelona. Observer: Mr R.G.C. Noble, Chief Officer.

8 April 1994. As the sun rose at 0525 UTC, its perfect refracted inverse image was observed immediately below the real sun, as shown in the sketches.



Initially, the image and real sun were joined, giving a sort of hourglass appearance with a rounded top but as the sun rose, the image dropped towards the horizon until it and the sun were just touching. At this time the sun was one-quarter of its diameter above the horizon; from that point the image separated from the real sun, sinking below the horizon just as if it was setting. By the time the real sun had risen to about half its diameter above the horizon, the image had set completely.

Weather conditions at the time were: air temperature 10.0°, wet bulb 8.6°, dew-point 7.1°, sea 13.5°, pressure 1014.6 mb, wind NW'ly, force 4.

Position of ship: 41° 18'N, 02° 11'E.

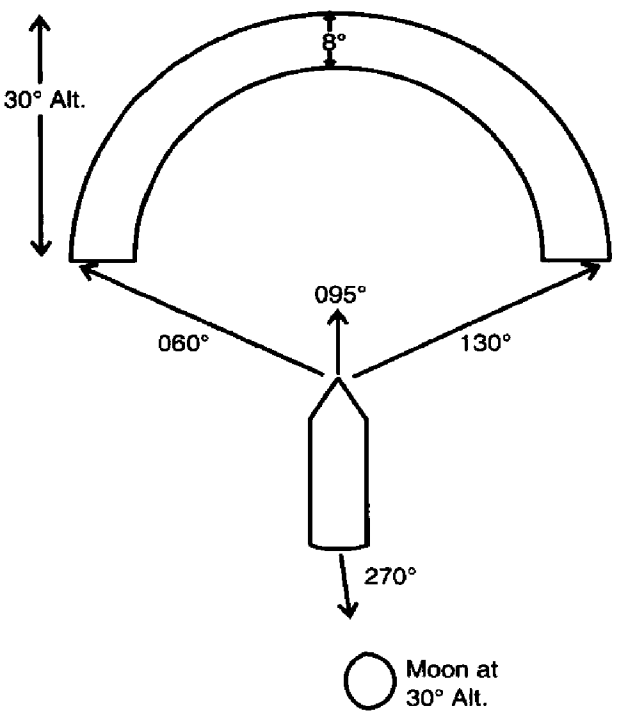
RAINBOW

South Pacific

m.v. *Mairangi Bay*. Captain B.W. Nuttall. Port Chalmers to Barcelona. Observers: the Master, Mr A. Millar, 2nd Officer, Mr R. Clunas, 3rd Officer, Mr P. Foster, Cadet and Mr D. Avery, SM1.

20 June 1994. At 0850 UTC as the vessel was steering an easterly course a complete lunar rainbow was observed, see sketch. The arc was right ahead of the vessel at an approximate range of 2 n.mile and its highest point was at an altitude of 30° while the width at that point was 8°. The rainbow appeared white with no

other colours visible; the ship's main and foremast lights were switched off to confirm that they were not the cause of the phenomenon. At this time the moon, in three-quarter phase, was obscured by mist.



At 0853 the area under the rainbow filled in so that a semicircular area of mist was illuminated and at the same time the mist and fog banks around the ship thinned enough so that they could be clearly distinguished; the moon and sky came into view and it was noted that there was no cloud.

At 0857 the area under the rainbow cleared of mist and the arc became clearly defined as its apparent width shrank to 3–4°. The ship appeared to pass through the arc until the rainbow was straddling it amidships; the mist continued to thin and the ends of the rainbow lifted, giving the impression of the arc 'straightening out' before it once again drew ahead of the ship. At 0911 the ship entered a thicker patch of mist, the moon became obscured and the rainbow disappeared.

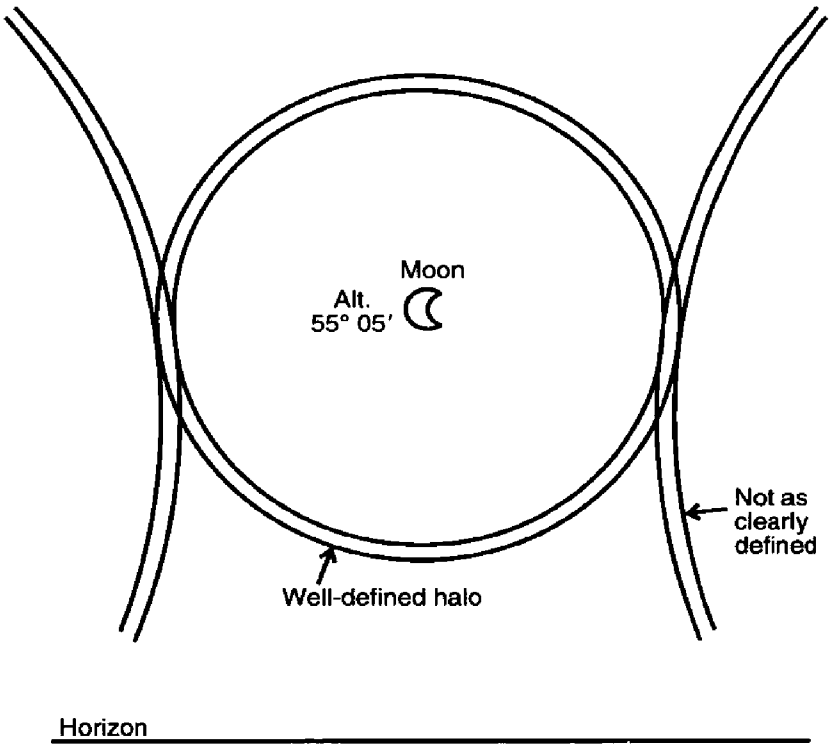
Position of ship: 52° 03′S, 112° 30′W.

HALO

Red Sea

m.v. *Wiltshire*. Captain F.R.F. Martin. Aqaba to Sitra. Observers: the Master and Mr A.B. Fleming, 3rd Officer.

21 May 1994. At 1930 UTC when the moon was bearing 214° with an altitude of 55° 05′ the halo shown in the sketch was clearly visible. It was well defined and lasted for about an hour, the arcs of contact being less well defined and visible for about 20 minutes only.



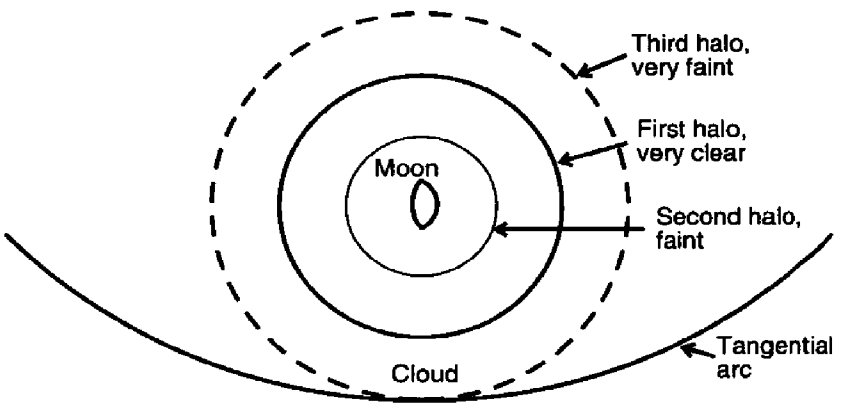
There were 3 oktas of cirrostratus with the air temperature being 33°. The wet bulb read 29.2° while the wind was NNW'ly, force 3. Visibility was excellent.

Position of ship: 21° 00′N, 38° 36′E.

South China Sea

m.v. *Kowloon Bay*. Captain I.W. Collister. Europe to the Far East. Observers: the Master, Mr J.S. Orr, 3rd Officer, Mr B.G. Wilkinson, Radio Officer, Mr J.C. Acheson, Bosun and Mrs Collister.

19 June 1994. At about 1230 UTC a halo was sighted around the gibbous moon; the halo was large and the area of sky around the moon was clear. At this time the moon's altitude was approximately 70° and it was bearing 175° from the vessel which was on a course of 026°.



As shown in the sketch, halfway between the moon and the main halo was another one which was fainter but still clearly visible whilst at about the same distance again but outside the main halo was a third one.

Attached to the outer halo was a tangential arc which may or may not have been a section of a further halo. This may have indicated a halo of 90° but the general consensus of opinion was that it was a halo of 46°. At 1300 the cloud around the moon began to dissipate and by 1330 the whole thing had disappeared.

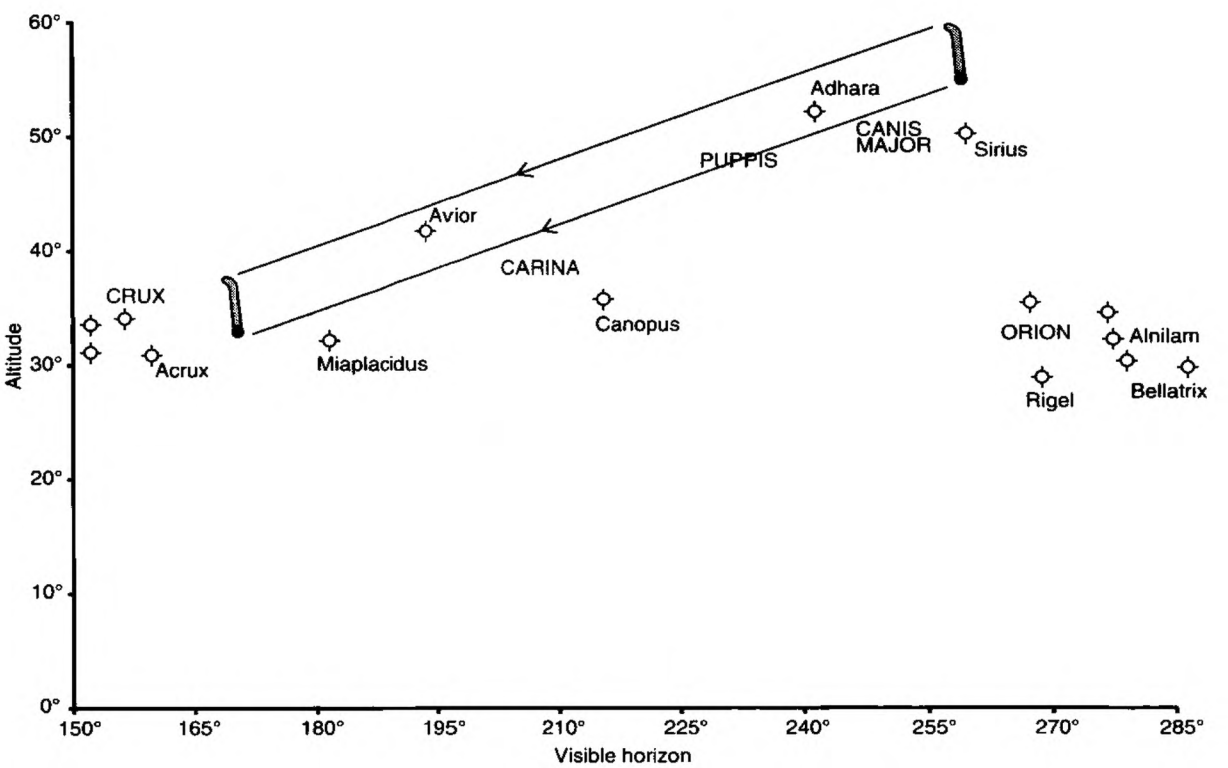
Position of ship: 11° 40′N, 110° 50′E.

UNIDENTIFIED OBJECT

South Pacific

m.v. *Forthbank*. Captain D.E. Ginder. Panama to Papeete. Observer: Mr A.D. MacPherson, Chief Officer.

7 May 1994. Shortly after sunset at 0337 UTC the 'object' shown in the sketch was observed crossing the sky from starboard. Initial observation was made as the object passed Sirius but whether or not it emanated from there remains unclear.



The passage of the object took about 20 seconds, appearing to follow a straight line through Canis Major, Puppis and Carina, and its luminous intensity was constant until a rapid drop just prior to extinction short of Crux. The object's 'tail' extended upwards about 3° in length with a curve towards the direction of travel and had a bluish tinge while the object itself was whitish in colour. No other phenomena were sighted other than a small patch of aurora australis about ninety minutes later.

At the time of the event the vessel was on a course of 250° at 17 knots, visibility was very good and the cloud cover was 1 okta of small cumulus.

Position of ship: 13° 09′S, 137° 49′W.

EARTH TREMOR

Western Pacific

m.v. *Welsh Venture*. Captain M.C. Roberts. At Shimotsu. Observers: the Master and ship's company.

11 May 1994. At 0858 UTC the vessel was alongside at Tonen No. 1 berth, cargo operations had been completed 55 minutes before and final paperwork and making the vessel ready for sea was well under way when the whole ship was shaken by a sudden and quite heavy shudder. A loud bang was heard at the same time. Immediate concern was for the possibility of an explosion either within the vessel or ashore at the refinery.

However, the berthing master suspected that it was possibly an earth tremor which, he assured the ship's officers, were quite frequent in the area and had been particularly numerous during the previous week. A call to the shore control room confirmed that this was indeed an earth tremor, measuring nearly 4 on the Richter Scale, according to shore measurements. The epicentre was estimated to be just inland from Miya Saki headland, about 3 n.mile from the vessel.

A thorough check of the deck, pumproom and engine room revealed no damage and no noticeable wave action was observed from the time of the event until the vessel had sailed and cleared the land two hours later.

Position of ship: 34° 30′N, 135° 08′E.

Marine Science and Technology at the turn of the Century*

Edited by N.E.R.C.

Introduction

The more we learn about the ocean, the more it becomes clear that the processes controlling its structure are phenomenally complex. Some are understood sufficiently for useful application, but there is no end in sight to fundamental discoveries about the ocean and life in it. Oceanographers do not believe that a theory of everything in the ocean is a realistic goal for the foreseeable future, but it is confidently predicted that the turn of the century will mark a revolution in oceanography as operational monitoring and forecasting become feasible for more and more aspects of the sea. Great benefits will derive for mankind, of whom three-quarters live within sixty kilometres of the sea. The ingredients of this revolution are better observations and models, and improved understanding of marine physics, chemistry, biology and geology. Increasingly though, this division into subject areas is seen as historic: the most important advances are and will be interdisciplinary and interfacial in nature.

Forecasting the ocean

As in most natural systems the equations that best describe ocean processes are non-linear and many aspects of the ocean exhibit the attributes of chaos. In that respect the ocean is similar to the atmosphere, it even contains storms and fronts like those in weather forecasts. Where the atmosphere has the extra complexity of phase changes and radiation, the ocean experiences biological feedback effects on many processes; living systems can react to environmental change by both action and by evolution, both of which may have a profound effect on the process of change. By the end of the century there will be a number of forecasting systems in operation around the world, based on mathematical models incorporating equations describing the interacting dynamics, physics and chemistry of the ocean. At first these will be designed to monitor and predict changes in quite small areas, often on the continental shelf where there are immediate customers for their products. The Proudman Oceanographic Laboratory is a world leader in this development, as it demonstrated by making forecasts during the Gulf War and for the *Braer* disaster off Shetland. The first steps are being taken to discover how far ocean behaviour is predictable. One limiting factor in such local area predictions comes from the open ocean boundaries. Global models are being developed to address that problem, and by the end of the century we should be in a position to link local models serving the needs of paying customers to global models designed to forecast the changing open ocean conditions. They will be coupled to global models of the atmosphere based on improved understanding of the air-sea interaction.

Observations

As in meteorology, the utility of such forecasts depends on the observations used to initialise them. Observations on the interior of the ocean are extremely difficult and therefore costly to undertake in the numbers required. By the end of

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the century there will be a growing demand for a reliable flow of ocean observations. The World Ocean Circulation Experiment (WOCE) was promoted with that requirement in mind and it is on course to deliver the first global description of ocean currents by the end of the century. Building on that information it will be possible to design an operational observing system to provide the data needed to initialise global models of the ocean. Planning for such a Global Ocean Observing System (GOOS) has begun. It will depend on successful demonstration of novel cost-effective observing systems being developed in the 1990s, including acoustic remote sensing and unmanned autonomous submersibles. The NERC *AUTOSUB* project is uniquely specified to provide trans-ocean observations to all depths, and NERC scientists are actively exploiting data from the ocean observing satellites such as ERS-1.

Multi-disciplinary simulation

Meteorologists work with a system governed by the laws of physics, and with most of its energy in weather systems of near-global scale. The fascination of oceanography arises both from the web of complex interactions between physical, chemical, biological and sedimentological processes and from the small scales at which variability is found. Simulating those phenomena by mathematical models has only recently become feasible thanks to the availability of powerful computers. Ocean modelling is seen as setting the pace for specifying requirements for new supercomputers. WOCE was designed in 1980 to provide data needed by ocean models running on Teraflop computers (capable of 10^{12} floating point operations per second). New experiments like GOEZS and GLOBEC are being designed now in the expectation that Petaflop computers will be available early in the 21st century. Mathematical simulation of the ocean will change oceanographic priorities and procedures over the next decade. One by one the classical paradigms of oceanography are being challenged by simulations that combine archive data and theory in a way that was not previously possible. Two discoveries by NERC scientists illustrate what is happening: the FRAM project predicted that the wind-driven circulation in the top kilometre of the ocean is steered by mid-ocean ridges two kilometres below the surface; the Lagrangian Ensemble ecology model has shown how turbulence aids the survival of plankton. Both results contradict well-established paradigms. Before going to sea to perform experiments it is becoming essential to check expectations by simulation using existing data assimilated into mathematical models.

Physical oceanography

After a decade during which the main emphasis has been on large scale structures and circulation, the emphasis in the next five years will include understanding processes operating at the scale of storms and fronts, and the way that the atmosphere and the ocean are coupled at many time and space scales. There is a continuing need to work out the consequences of Swallow's famous discovery of energetic transient eddies extending to all depths in the ocean. High priority will be given to addressing issues revealed by the first eddy-resolving models, like FRAM, which simulated the observed link between bathymetry and circulation and the heterogeneous geographical distribution of oceanic storm energy.

As data from WOCE become available, emphasis will be placed on synthesising these to provide a global picture of ocean circulation. Repeated observations will

be used to resolve seasonal changes in the ocean's climate and changes that may span time periods of decades or centuries. Detection of changes this slow requires very long term commitment to collecting time series data. In addition, recent research indicates that processes in the ocean may cause the global climate to flip from one state to another within as little as a decade, so that understanding of decadal and longer-term variability in the ocean is a prerequisite for climate forecasting. Problems experienced by climatologists in coupling physical models of the ocean and atmosphere have emphasised the long-standing failure to predict the heat flux through the sea surface. One approach to this problem is to improve understanding of the seasonal boundary layer of the upper ocean, which is also central to plankton ecology and applications in defence and pollution management. In coastal oceanography, the focus is shifting towards the problems of interaction between shelf seas and, on one side, the land, and on the other, the open ocean.

Biological oceanography

Biological oceanographers have solved one of the great problems of their subject: what do the animals living kilometres down on the ocean floor live on? The solution, now well documented by NERC's Bathysnap camera, is that they feed on phytoplankton raining down as manna from heaven according to regional and seasonal patterns established by the ecosystem in the top hundred metres of the ocean.

The challenge to biological oceanography in the next decade is to understand the interacting physical, chemical and biological processes that drive and control the structural and functional attributes of organisms in the sea. Of particular interest are the plankton of the surface mixed layer, the benthos of both the shelf seas and deep ocean, and the migratory organisms that help to couple the biogeochemical dynamics of the plankton and the benthos. These communities are complex, both in their inherent biological properties and in their dependence and effects on their environment. New tools will be needed to sample this richly diverse biology, and to relate it to its physical and chemical environment, dominated by mesoscale variability on scales of order ten kilometres.

The complexity of biological systems and their variability in space and time requires that new procedures are developed which can be deployed for measurement at appropriate scales. These will range from fundamental studies on the biology of individual organisms, using the techniques of molecular and cell biology, to basin and ocean scale research, using airborne and satellite remote sensing, and optical and acoustical remote sensing inside the ocean. These measurements will be related to simulation by models incorporating novel algorithms.

The products of this research will contribute to insights on the evolution and maintenance of biodiversity in the ocean, and to a quantitative understanding of the consequences to ecosystem function of a loss of diversity both at the genetic and the species level. The research will also contribute improved parametrisations for global models linking ocean biological processes to such critical environmental questions as global climate change, eutrophication, the balance between exploitation and conservation of renewable resources, and the effects of anthropogenic factors on marine plants and animals.

Marine chemistry

Through the application of new measuring techniques and chemical models,

marine chemistry has made substantial progress during the last decade both in improving our understanding of the oceans as a biogeochemical reactor and in making fundamental contributions to interdisciplinary studies. UK scientists have made important contributions to these developments and are strongly placed to play a leading part in meeting the challenges of the next decade.

The basic principles underlying the control of sea water composition have been elucidated and physico-chemical models of great accuracy can now provide a quantitative basis for understanding key features such as the carbon dioxide system. A wide range of organic and inorganic chemical tracers (both natural and man-made) can now be used to follow water movements on local and basin-wide scales, to study the air-sea exchange of biogenic gases, to identify and quantify the flux of particulate material from the ocean surface to deep water and of dissolved material emanating from mid-oceanic ridges. Isotopic tracers enable the impact of rock weathering and plate tectonics on ocean chemistry to be assessed and provide 'clocks' for determining the rates of particle transport and disintegration in the deep sea. The signatures of many of these tracers can be followed in the sedimentary record where they provide proxies of ocean salinity, temperature, nutrient content, ice cover and ocean currents that are opening up the interpretation of past global change. These measurements place extreme demands on the state of the analytical art. In many instances the marine techniques are at the forefront of analytical chemistry. Significant advances have been made in our understanding of the concept of biological availability and of the control of primary productivity by nutrient and trace compounds both in the open ocean and in shelf and coastal seas. The contributions made by marine biogenic gases to the chemistry of the atmosphere have been identified and their implications for the regulation of global climate are being assessed.

In addition to being a vigorous science in its own right, marine chemistry will continue to make fundamental contributions to the development of both physical oceanography, through the ability of chemical tracers to label water masses and to determine their age, and to biological oceanography, through the use of tracers to elucidate the mechanisms of biological fixation and transport and by providing specific analyses of the distribution and availability of toxic and nutrient components. More emphasis must be placed on these interdisciplinary process studies and on the development of automated chemical techniques that will extend our ability to map, in three dimensions, the distributions and properties of the key chemical components.

Meteorological Education and Training: Past, Present and Future[1]

By Werner A. Baum[2]

Introduction

Meteorological education and training encompasses a broad territory, as indicated by the four classes of personnel identified by the World Meteorological Organization[3]. I shall confine the discussion here to the sector with which I am most familiar: the university level or, essentially, the first two of the four WMO categories.

The vast changes in our science and profession over the last fifty years have been matched by the changes in the education of our successors, both in what they must learn and how they are taught. In assessing what has happened and what might be expected to occur, it quickly becomes apparent that one must distinguish between two worlds: the electronic world and the pre-electronic world. In reality, of course, there is a virtual continuum, and one may expect that eventually the entire world will be electronic. Furthermore, even today, some Weather Services which are internally pre-electronic do have access to products generated in the electronic world and need personnel qualified to deal with them. Nevertheless, the distinction between the two worlds is meaningful and useful.

The electronic world

I happen to live in the U.S.A. and at Florida State University, so I shall discuss meteorological education in the electronic world from that vantage point; there are no doubt other perspectives within my world, which encompasses many nations on several continents. However, many threads are common to all of us. These include the following, which have had and are having major impact on meteorological education:

- The forecast problem on the scale of the extra-tropical cyclone has been largely solved;
- Relatively little progress has been made on the mesoscale forecast problem, the scale which presents many practical problems to the citizens of our nations. Much short-term hope lies in new observational equipment, such as Doppler radar and wind profilers, which are now being introduced and are generators of immense volumes of data;
- Notwithstanding the claims of some researchers, little progress has been made on seasonal forecasts, where significant accuracy improvements would be of great importance to enterprises in sectors such as agriculture and fuel distribution;

  Systems exist which permit meteorologists to receive, process and analyse the huge amounts of data generated by the myriad of new observational devices.

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[1]Reprinted from *WMO Bulletin 43(4)*, October 1994, pp. 297–299, by kind permission of the Editor.

[2]Professor Baum is Dean Emeritus, College of Arts and Sciences and Professor Emeritus of Meteorology, Florida State University. From 1971 to 1979, he was a member of the EC Panel of Experts on Education and Training.

[3]See the third edition of *Guidelines for Education and Training of Personnel in Meteorology and Operational Hydrology* (WMO-No. 258), in particular its revised Chapter 2 (*Ed.*).

Additionally, communications systems have been developed — such as the Weather Channel on cable television in the U.S.A. — which allow the meteorologist's final product to be disseminated and used on a much broader scale than was the case a generation ago.

Profound effects have been felt in both national Weather Services and in education. The U.S.A. is in the midst of a massive modernization and associated restructuring. West European nations have joined together in a multi-national guidance centre, and it seems safe to predict that there will eventually be other structural changes in the Weather Services of the European Community.

Probably indicative of things to come, the restructuring in the U.S.A. calls for a reduction in the total number of personnel in the Weather Service but it requires a significantly higher level of sophistication among the remaining personnel. The new field offices, for example, will each have a science operations officer who will serve as the office's technical director and as the principal scientific advisor to the staff. The staff must be familiar and up to date with such matters as the limitations and characteristics of mathematical forecast models generating their guidance materials, and the distinctions between what satellites see and do not see.

Each weather forecasting office — and 116 of them are envisaged for the U.S.A. — will need a complement of Class I and Class II meteorologists (to use familiar WMO terminology [University and secondary school trained personnel with a good knowledge of mathematics, physics and meteorology, capable of weather forecasting, research and analysis, and interpretation of observational data]) whose education must have emphasized the use of guidance products from central units to produce localized watches and warnings for the general public for local storms, floods, flash floods and winter storms, as well as local and zonal public forecasts, fire weather and agricultural and aviation forecasts. Universities must re-orient their curricula accordingly. Quite obviously, mesoscale meteorology is assuming a vastly greater importance in day-to-day activity at weather forecasting offices.

At the same time, we need the personnel to staff the central units producing the guidance, both general guidance and that specific to tropical storms and tornadoes. The burden of the university, thus, becomes broadened considerably beyond its scope in earlier decades. Some universities will choose not to participate, preferring to emphasize basic research or aspects of our field, such as air pollution or climate change. In the U.S.A., at least, the education system is, fortunately, sufficiently large and diverse to provide for the various needs of the science and the profession.

Curricular changes at most universities have been dramatic in this context. The fairly sharp distinction which used to exist between synoptic and theoretical meteorology has become very diffuse: physical meteorology has assumed a new importance, especially with respect to atmospheric chemistry; climatology has acquired respectability and enormous importance with respect to climatic change (even though we seem to be making no meaningful progress on the seasonal forecast problem); and some knowledge of computers and model structure has become essential.

Also striking are the changes in the way we deliver education. Simple examples suffice to illustrate this point. At Florida State University, 45 years ago, we had to have special tables built for map work, with the table top appropriately inclined for convenient plotting and analysis; today these have all been replaced by flat

surfaces with electronic stations. The teletype machines have been replaced by antennas on the roof and computers which ingest the data and make them available in sophisticated, processed forms through the work stations.

Learning at a distance used to take the form of correspondence courses — a slow and often tedious process. Now it takes the form of highly interactive computer based modules, which are distributed to the National Weather Service and military field stations from a central forecasting facility.

The pre-electronic world

Large parts of the world cannot yet afford the type of environment discussed above. There, the character and style of meteorological education must, of necessity, differ. The earlier the stage of development, the closer the educational needs will be to those which characterized all of us from a decade to four decades ago.

Generalizations about this diverse pre-electronic world are difficult and not universally true; nevertheless, some observations do appear in order.

As one result of the changes in meteorological education, the use of long-term fellowships warrants very careful consideration by WMO, the Member nations receiving them, and the educating institutions. Little is to be gained by educating operational personnel with facilities which are strikingly different from those they will have at their disposal on their return home. The use of long-term fellowships at universities in the electronic world should be confined as clearly as possible to individuals who are expected to have responsibility for dealing with computer products in their work, or who are expected to move their Service farther along the road to full participation in the electronic world, or who are expected to provide scientific and administrative leadership in their nation's meteorological structure for decades to come. Perhaps this reality contains within it the seeds of increased responsibility for the Regional Meteorological Training Centres of for some universities in the pre-electronic world.

The short-term fellowships will meet a significant need as long as the practice of meteorology evolves , i.e. indefinitely, and the balance between the two types of fellowship should studiously reflect the perceived needs of the varying nations of WMO.

Finally, the pre-electronic nations should carefully select, by primary interest, the students they subsidize to study abroad. This suggestion is based on the personal observation that foreign students who come to study in the U.S.A. do not seem to distribute themselves over specialities in a pattern reflecting the likely needs of their nations. There is considerable untapped potential for economic development in applied climatology in all nations, yet relatively few students emphasize that in their studies, Asian students especially, while very good at it, tend to incline heavily towards theoretical meteorology and fluid dynamics. While every nation needs a theoretical presence, especially amongst its university faculties, the major needs of these societies tend to be more practical — including movement toward the electronic world.

Conclusion

In one lifetime we have seen meteorological education shift from Weather Services to universities, from an empirical basis to a theoretical basis, from the drawing of isolines to the interpretation of computer products. The one persistent thread is the need for increased intellectual ability and sophistication on the part of

the student. No one would — or should — seek to predict just what changes will take place in the twenty-first century, or even the first quarter of it. Regardless, it seems that we shall need more extensively and deeply educated personnel.

SPECIAL LONG-SERVICE AWARDS

Four shipmasters with long and distinguished observing service to their credit up to the end of 1993, have, in common with long-standing practice, been selected by the Met. Office Chief Executive to receive presentation barographs inscribed with their names and period of observing, as follows:

CAPTAIN M.L. BECHLEY, formerly P&O European Ferries (Portsmouth) Ltd
CAPTAIN J.R. FRENCH, Ministry of Agriculture and Fisheries (MAFF)
CAPTAIN D.L. RATTRAY, Scottish Office, Agriculture and Fisheries Department
CAPTAIN M. WATTS, P&O Containers Ltd

Selection for these awards is made on the basis of the number of observing years in which meteorological logbooks were received from ships recruited to the United Kingdom Voluntary Observing Fleet, including the year in question (1993), and a minimum of 18 observing years. For this purpose it is unfortunately not possible to take account of time spent in observing ships of another country's fleet of voluntary ships, as each country has its own individual awards scheme.

Captain Bechley sent his first meteorological logbook to the Met. Office from the B.I. educational passenger ship *Nevasa* in July 1969 and in 23 observing years submitted a total of 55 logs, including 27 rated 'excellent', and has received eight Excellent Awards. He commanded P&O European Ferries vessels from 1982 until early 1994 when he joined the Met. Office as Port Met. Officer for Scotland and Northern Ireland. He is currently a member of the METROUTE team in the Office's world-wide ship routeing service, and is the first shipmaster to be nominated for a barograph award whilst actually serving in the Met. Office.

Captain French's first of a total of 45 logs was received from Shell Tankers' *Voluta* in February 1963 during his 21 years of observing up to the end of 1993. His first log from the MAFF Research Ships came from *Corella* in 1973. Twenty-three of his logs have been given an 'excellent' marking, and he has received Excellent Awards on 11 occasions.

Captain Rattray was Fourth Officer with Anchor Line when he sent in the first of his logs from the *Elysia* in October 1957. Following his transfer to MAFF in the early 1970s, and then to the Scottish Fisheries Department in 1976, he has provided a total of 60 logs, 23 of these being marked 'excellent'. He has received ten Excellent Awards for his efforts.

Captain Watts was serving in Bibby Lines' *Shropshire* in June 1969 when his first log of a total of 59 reached the Office. After a period with T. & J. Harrison, his first log from Container Fleets/P&O Containers came from *Encounter Bay* in 1972. During his 25 observing years, he has had 24 logs assessed as 'excellent' and has received three Excellent Awards.

The 47th annual ceremony since the long-service award scheme was introduced in 1948 by Sir Nelson K. Johnson, the Director of the Met. Office from 1938 until 1953, will take place some time in 1995. The Marine Superintendent will make the usual endeavours to try and gather together all four shipmasters, as well as their ladies and company representatives, at a suitable time during the year when the Chief Executive will also be free to make the presentations on this special occasion.

AURORA NOTES APRIL TO JUNE 1994

By R.J. Livesey

(Director of the Aurora Section of the British Astronomical Association)

In Table 1 is the only marine observation of the aurora received to date for the period under review. One would think that the lack of reports from ships implies that the aurora and hence the sun has not been very active but this is far from the case.

Table 1 — Marine aurora observations April to June 1994

Date	Ship	Geographic Position	Time (utc)	Forms in Sequence
6/7 May	*Cumulus*	52° 31'N, 20° 11'W	0120–0245	Glow

Figure 1 comprises a Bartels Diagram in which dates are set out in consecutive horizontal rows 27 days long, each row representing one rotation of the sun upon its axis as seen from the Earth. The date of the first day in each row is given on the left-hand side and the year on the right. The dark squares indicate the days upon which Planetary Magnetic Index K_p reached a value of 5 or more in any three-hour period in the 24-hour day. The tendency for activity to repeat with successive rotations of the sun is evident and two zones of solar activity, one represented by the squares at the two sides of the diagram and the other by the major area in the centre. Both activity centres on the sun comprised what are called coronal holes where the sun's magnetic field continues into interplanetary space and does not curve back into the sun. Electrified particles are able to escape from the sun down these open field lines as high-speed solar wind streams and interact with the Earth's magnetic field to cause the production of relatively quiet mid-latitude aurorae. This type of activity is a feature of the declining years of the sunspot cycle.

There was an aurora on 16/17 April accompanied by a shock event in the Earth's magnetic field called a storm sudden commencement together with a magnetic storm. This was caused by what is termed a coronal mass ejection when part of the sun's atmosphere in the surrounding corona is pushed bodily out into space. The resulting high-speed mass of electrified particles overtakes the slower

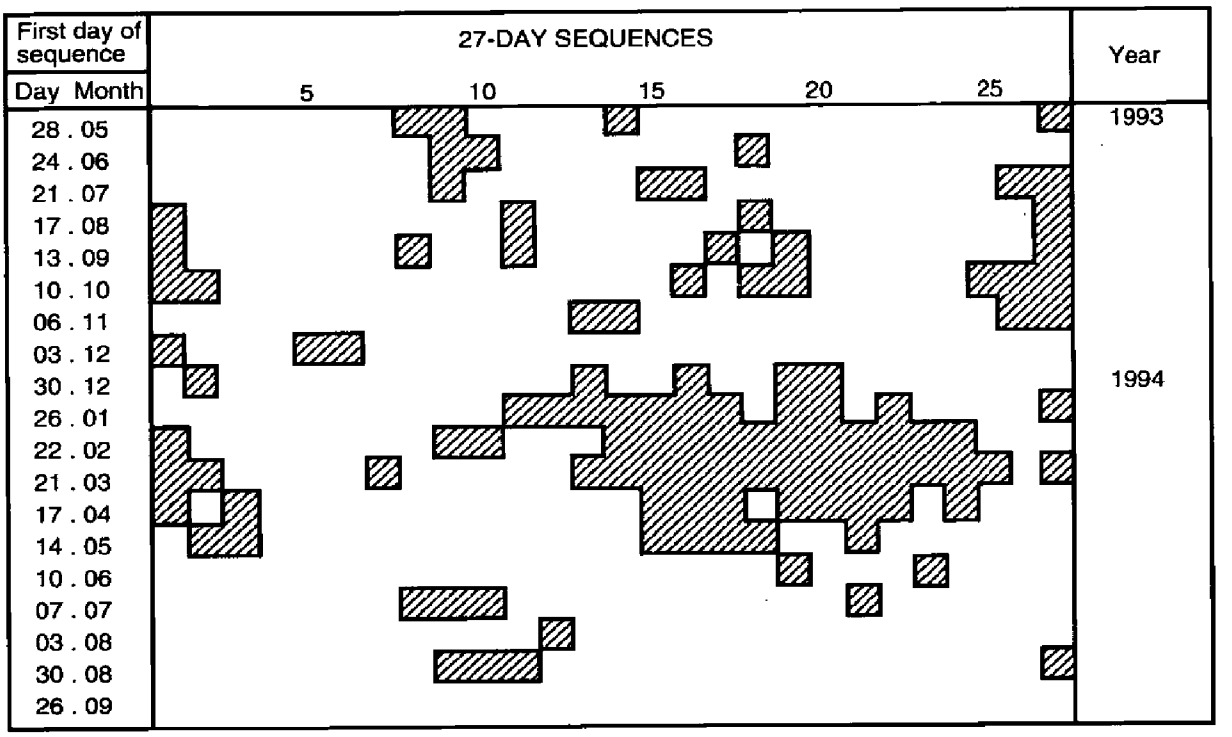

Figure 1. Days when planetary index K_p equalled or exceeded 5 in any 3-hour period in a 24-hour day.

solar wind of particles evaporating from the sun to cause shock waves in interplanetary space and eventually at the Earth. Active aurora was observed from Dundee, Fair Isle and Shetland during the evening of the 16th but maximum magnetic activity took place over Canada and The U.S.A. This was followed by active aurora well seen from New Zealand as the Earth spun round under the active auroral ovals. The aurora was all-sky and coronal in North Dakota and reported to be 70 degrees above the horizon at Detroit. The aurora was reported to have reached the zenith at Dundee, Scotland.

To date some 88 reports of auroral activity were received for April, 45 reports for May and 33 for June. By the latter month summer twilight was affecting observations in northern Scotland but North American observers could continue to detect aurora due to the darker summer skies at their latitudes.

Over the centuries there has been a long debate as to whether or not, under suitable conditions, sounds can be heard at ground level during the course of an intense overhead auroral display. Observers have reported crackling, swishing or sounds like a distant waterfall, the sound modulating with the flashing and pulsations of the overhead aurora. Sounds have been heard by some professional scientists while other scientists have heard nothing at all. A recent enquiry to our observers has elicited positive hearings from Canada, Orkney, Fair Isle and Sweden.

No satisfactory explanation of the phenomenon has been given to our knowledge but three theories at least have been proposed. The American physicist Elias Loomis (1811–1889) was of the opinion that people hear what they expect to hear and that a rapidly flashing light conjured up the thought that it ought to be accompanied by sound. There is nowadays a view that widespread bright flashing

lights could indeed set off a response in the audio nervous system thereby leading to perceived sound. This has been suggested as one possible explanation for auroral sound.

A second explanation, favoured by Professor Carl Størmer (1874–1957) the Norwegian aurora investigator, is that the noise is generated by point electrical discharges at ground level, rather like the crackling heard at a lightning conductor during the build up of an intense thunderstorm. In the normal atmosphere the electrical potential in the atmosphere at the Earth's surface is of the order or 120 volts per metre. Measurements have shown that both during thunderstorms and beneath intense aurora this potential can rise considerably and peaks of 10,000 volts per metre have been reported. High voltage gradients can exist at sharp objects such as pine needles, trees, bushes and even human hair such that brush discharges could occur under these circumstances. Mariners are familiar with one such type of electrical discharge in the form of St Elmo's Fire on mast heads, aerials and deck furniture. During the major aurora storm of 13/14 March 1989 it was observed that a cat's fur became electrified as it stood terrified in its owner's garden beneath intense auroral activity. This seems to be a likely explanation for auroral noises.

A third explanation has been proposed recently by Dr Keay, of the University of Newcastle, in Australia. The aurora emits very low frequency radio waves and it is possible for ground-based artifacts to resonate to these waves and emit sound waves. Tests made in an anechoid chamber have shown that materials from barbed wire to spectacles can form transducers between radio and sound waves. This research stemmed from an attempt to explain the observation of sounds at ground level on the occasion of a large fireball seen over New South Wales. It was thought that perhaps the generation of turbulent electrified particles by the passage of the fireball through the atmosphere could have generated very low frequency radio waves to react with ground-based transducing materials.

Footnote: As can be seen from the above table, auroral sightings are not being recorded in ships' logs as often as in the past. Surely some observers were in a position to see the many auroral events in the quarter of 1994 reviewed by Mr Livesey in his newsletter?

Now that *Cumulus* is normally deployed near latitude 52°N instead of 57°N, we can expect even fewer reports from our Ocean Weather Ship. Editor.

Book Reviews

The Weather Handbook by Alan Watts. 137 mm × 221 mm, 187 pp, *illus.* Published by Waterline Books, an imprint of Airlife Publishing Ltd, 101 Longden Road, Shrewsbury. Price: £12.95.

In Chapter 1 of this book appears its *raison d'être* when the reader is urged to 'Listen to the forecasts, note what they say and then use your own knowledge to refine the details for your own area'. A wealth of help and information follows.

Meteorology is not a subject that can be readily learned from a book, as it combines the physics theory with the observation of that theory demonstrated in practice by nature. *The Weather Handbook* is a distillation of the experience and knowledge drawn from the author's 60 years of fascination with the weather, a period which includes a career as a Met. forecaster, and one of its purposes is to

give the 'do-it-yourself' forecaster a deeper insight into the interpretation of chart patterns shown in visual weather presentations, to read between the lines, as it were, whilst showing how to compare that understanding with what may be happening outside.

Alan Watts uses his wide experience to guide the reader through the tell-tale signs of the clouds and wind and describes, with the aid of colour photographs, satellite pictures, charts and diagrams, the expected outcome together with the basic supporting theory. He is sometimes given to sounding as if he is briefing his relief forecaster who would probably have some idea of the weather situation already but the reader new to the subject will look at a given figure and perhaps not grasp the analysis immediately. However, the book is written in a relaxed style so that repeated readings of a passage are not arduous. The cross-reference system is a little obscure at times; on one occasion in a section on occlusions, the reader is recommended to jump ahead to the 'reference section' in order to read more. The reference section, as such, does not exist but trial and error with the index finally reveals a page in a section headed in the contents as Information and Explanations. On another occasion the reader is given a past reference for an item that first appears several pages ahead.

Despite these points and a few 'typos' (including a unique spelling of the word 'knobbly'), *The Weather Handbook* is well produced and holds a huge amount of information considering its subject and its relatively few pages. Alan Watts' enthusiasm for his subject could well be infectious to those who look at the sky and wonder what sort of weather could be coming along next.

J.F.

Personalities

OBITUARY — CAPTAIN J.L. DUNKLEY, CBE, RD, RNR died on 26 September 1994, shortly after his 86th birthday, bringing to an end a life of dedication to maritime affairs.

James Dunkley was born on 13 September 1908, the youngest of four remarkable brothers, all of whom excelled in their chosen professions, and two sisters. Their father, a Warwickshire farmer, was tragically killed when James was eighteen months old. He attended H.M.S. *Worcester* for two years as a Cadet for pre-sea training, leaving the ship in 1925 with a commendation from Lord Inchcape. He spent his working life in the service of the P&O Steam Navigation Company, a career only broken by war service in the R.N.R. After command in cargo and passenger ships, he was appointed Commodore of the P&O-Orient Fleet in 1964, remaining Captain of *Canberra* until 1968, when he came ashore as Marine Superintendent, a position he held until his retirement in 1973. He maintained a good marine observing standard throughout his sea career, although many of the meteorological logbooks he had a part in were compiled for other Commonwealth countries and therefore do not appear in U.K. records.

In 1962 Captain Dunkley became Royal Naval Reserve ADC to H.M. the Queen, in which capacity he accompanied Her Majesty on her official visit to his Training Ship in July of that year. On being elected a Liveryman of the

Honourable Company of Master Mariners in 1965, he was admitted to the Freedom of the City of London, and five years later he was elected Master of the Honourable Company. In retirement he always gave generously of his time to the Missions to Seamen, the R.N.L.I., the Sea Cadets and as a practising Christian to his Church. To his great sorrow his wife Phyllis became ill and died after they had been married for over 30 years, at a time when his shore appointment would have given them a life together. His memorial service at the Missions to Seamen Church in London, St Michael Paternoster Royal, on 1 November last, was attended by many friends, and we offer our condolences to those friends who will miss him, particularly his daughter Ann-Mary of whom he was so proud.

RETIREMENT — CAPTAIN K.J. OWEN retired in 1994 after 42 years sea service spent with the Alfred Holt company and in container ships.

Kenneth James Owen was born in August 1934 and educated at King's School, Macclesfield. In 1952 he was apprenticed to Alfred Holt and Company of Liverpool, being appointed to Blue Funnel Line's m.v. *Aeneas* as his first ship. Up to 1982 he also served in the Ocean Group's ships of Glen Line, Elder Dempster, Overseas Containers and Straits Steam Ship Company, during that time obtaining his Master's Certificate in 1962. He was promoted to command in 1982, his first ship as Master being *Bengal Enterprise*, and in the same year he transferred to OCL, later P&OCL.

Captain Owen sailed in a number of P&O Containers' ships, and commanded *Liverpool Bay, Strathconon* and *Peninsular Bay*, the last of which can carry over four thousand containers and which he compares to the Blue Funnel cargo liner *Ajax* which could barely fit twelve containers on deck, when he was involved with the introduction of the then 'new' method of cargo transport in 1970. He saw the first container loaded on the Far East to Europe trade, a matter of manhandling it with long wooden poles on the quay at Hong Kong, in comparison to today's containers arriving by truck, one every nine seconds.

Although he began weather observing on Blue Funnel ships several years before, the first of Captain Owen's meteorological logbooks recorded in the registers held in the Met. Office archives was received in December 1962 when he was Second Officer of *Glenroy*. There is then another long gap in his records until he was Chief Officer of *Ajax* in 1970. This anomaly is accounted for by the fact that any missing records must have been from ships recruited by another Commonwealth country, and such records do not come within the ambit of another country's. Captain Owen sent in a total of 46 logs to the U.K. Met. Office, 21 of these being marked 'Excellent', and he received Excellent Awards in 1983 and 1990. His was also the first logbook to record a sighting of Comet 'West' off the coast of West Africa in 1976.

Captain Owen has the distinction of being involved in five separate rescue incidents at sea, being responsible for the recovery of 59 persons. In 1963 he was in charge of the lifeboat from *Glenroy* which picked up the Captain who had fallen overboard from his tanker in the Indian Ocean and who had been in the water for about five hours. The *Liverpool Bay* was traversing the South China Sea in 1984 when he took his ship to the rescue of 41 Vietnamese refugees as their boat was sinking under them. On the *Strathconon* in 1986 he enabled the rescue of French yachtsman Eric Tabarley in a severe North Atlantic gale. He also carried out two rescues when in command of *Peninsular Bay*; in 1990, after an expanding square

search, he picked up all 14 crew members of a Thai freighter that had foundered in the South China Sea, and in 1992 he rescued two Algerians who ran out of water whilst attempting to row to France in a two-metre inflatable raft.

Despite these experiences, Captain Owen still believes in the regular collection of data for the met. log as a means of keeping the watch officer alert and aware of weather details that can suddenly become so vital, even on today's very large ships with warm and comfortable bridges. He says he always appreciates the letters of gratitude received from the Office in return for the log records completed on board, and finds the skill and dedication of Met. Office staff producing the forecasts very helpful.

Captain Owen retired on 1 September 1994 and we wish him well in retirement when we hope his memberships of the Royal Institute of Navigation and the Nautical Institute give him satisfactory pastime, among others, from his home in Stockport, Cheshire.

RETIREMENT — CAPTAIN R.A. WOODALL left his last command, R.M.S. *Queen Elizabeth 2* on 30 October last, prior to his retirement after 44 years of sea life.

Robin Allen Woodall was born in Dollis Hill, London, in December 1933, and educated first at University College School, Hampstead between 1942 and 1946, and then to 1950 at Birkenhead School when his parents moved to the Wirral, near Liverpool. He joined the Cunard Steam Ship Company Ltd as Apprentice Officer in July 1950 and sailed in s.s. *Arabia* the following month. Whilst serving his time for his various certificates he sailed in many well-known Cunarders, mainly on the North Atlantic and Mediterranean services but occasionally world-wide, including *Franconia, Parthia* and *Mauretania*, passing for his Master's Certificate in July 1960. In the following year, Captain Woodall joined the Royal Naval Reserve on List One, undertaking regular training throughout the rest of his career until he retired from the RNR as Captain in December 1993. He is also a Member of the Honourable Company of Master Mariners.

Captain Woodall's first appointment to Britain's foremost passenger ship came in December 1968 when he joined R.M.S. *Queen Elizabeth 2* as Second Officer, whilst the ship was fitting out on the Clyde prior to sea trials. He sailed on the maiden voyage of the ship in April 1969 and was on board when passing through the Naval Review at Spithead in July of that year. Whilst First Officer of the ship in September 1973, he was detached from the *Queen Elizabeth 2* for a 52-day round-the-world port inspection, flying 38,700 miles and visiting 28 cities in preparation for the ship's first world cruise which took place in 1975.

After serving in many famous Cunard liners, he was appointed Relief Master in January 1982, his first command being *Cunard Princess* on Caribbean cruising, being made permanent Master the following year. He first took command of *Queen Elizabeth 2* as Relief Master in September 1987, being permanent Master of the ship from July 1990 until his retirement. During his 26 years when weather observing at sea was possible, Captain Woodall submitted 46 meteorological logbooks, 15 of which were assessed as Excellent.

Captain Woodall sent us a copy of his meticulous diary of the main events in his sea life, which make interesting reading. He was involved in many prominent incidents, which so often became headline news, particularly during his years in *Queen Elizabeth 2*. To name but a few, he was Fourth Officer in the *Brescia* in

1955 when attacked by Turkish rioters at Izmir, making an all-night defence of his ship with fire hoses and axes, the ship sustaining considerable superficial damage until the militia arrived to drive off the rioters. He was witness, and at times active participant, to about a dozen sea rescue incidents and during the time of the (false) bomb scare on *Queen Elizabeth 2* in May 1972 in mid-Atlantic, he took the boat out to pick up four British Service personnel parachuted from a Hercules aircraft.

He also seems to have shared in many of the more dramatic incidents, such as encounters with hurricanes, docking in New York without tugs, the 'blacking out' of the ship after she ran into a shoal of jelly fish which blocked the cooling water intakes, and the grounding off Vineyard Sound off the coast of Long Island in August 1992. He has the distinction of receiving official visits on board from Her Majesty the Queen and HRH Prince Philip, and from former Prime Minister Margaret Thatcher on the occasion of the tenth anniversary of the Falklands War. He also took the ship to the Spithead Review for the D-Day 50th Anniversary commemorations in June 1994, for the review from the Royal Yacht *Britannia* by Heads of State and subsequent wreath-laying ceremonies in the middle of the English Channel.

Captain Woodall writes to us that he has enjoyed his life at sea, with its great variety and the opportunity of seeing many parts of the world. In the later years in command he found the 'hands-on' driving experience most satisfying, equated with meeting such a wide variety of people on passenger ships. He has found most weather forecasts, and the services of the Met. Office Ship Routeing Service, METROUTE, [first undertaking the issue of advice for the routeing of *Queen Elizabeth* in July 1987] in particular, to be of valuable assistance in enabling him to plan ahead. His message for those following him in a career at sea is not to forget the value of good seamanship in this modern age, never stop learning about the sea and never underestimate its power.

We take this opportunity to thank Captain Woodall for his valuable contribution to marine observing, and to wish him, and his wife Eileen, at home in Hoylake, Wirral, happiness and fulfilment in retirement when he hopes to continue his chosen pursuits of sailing and racing his yacht *Highlight*, and country hiking.

RETIREMENT — CAPTAIN A.F. ASHTON has retired from his position as Port Met. Officer for the Bristol Channel, based in Cardiff.

Archie Ashton was born in Cardiff on 19 March 1934 and educated at Canton High School. From January 1950 to December 1951 he was a Cadet on H.M.S. *Conway* and then went to sea as a Cadet with Canadian Pacific Steamships, joining the *Beaverglen* in January 1952. In October 1954 the first of his many meteorological logbooks was received at the Met. Office from his ship, s.s. *Empress of Australia*.

Much of Captain Ashton's sea career is detailed in the third of the series entitled *Meet the Port Met. Officers*, published in this journal in January 1994, describing his 17 years with Bristol City Line, during which time he gained his Master's Certificate in 1960 and promotion to command in February 1967, when he was appointed Master of s.s. *New York City*. This was followed by a further three years on the North Atlantic trade in command of the Bristol City Line ships. He spent the better part of 1970 as Owner's Representative in Montreal covering all Eastern Seaboard and Great Lakes ports of the U.S.A. and Canada.

On his return to the U.K. in 1971, he took command of the second new building for Dart Line, *Dart Atlantic*. In 1972 Bibby Line acquired Bristol City, and, after two more years on the North Atlantic, Captain Ashton transferred to Bibby's general cargo ships trading on the spot market, which was a great change of scene for someone 'brought up' on the North Atlantic.

During 22 years of observing the weather at sea, Captain Ashton helped to compile no fewer than 57 logs, 36 of which obtained the best assessment of 'Excellent', and for his expertise in this field he was nominated for Excellent Awards on six occasions. His efforts were further rewarded in 1976 when he was presented with a long-service barograph by the Director General. After two years of tramping and one with Island Navigation, Hong Kong, on coming ashore in 1978 he joined the Marine Directorate of the Department of Transport as a Nautical Surveyor. He also acted as an Examiner of Masters and Mates up to the end of 1984.

In January 1985, Captain Ashton joined the Met. Office and was first appointed to fill the Sea Ice post on a temporary basis. With his extensive knowledge of ice conditions in the North Atlantic, this was an ideal job for him at the time. In November of the same year he took up the position of Port Met. Officer in his home town of Cardiff, based at the Weather Centre, where he remained up to the time of his retirement, due on 31 March this year. He expects to continue his keen association with the STA, having sailed regularly as Navigator in their Sail Training schooners *Sir Winston Churchill* and *Malcolm Miller*, also taking part in the 1991 Tall Ships Race.

We wish him and his wife Dorothy happiness and success for a long and fruitful retirement, no doubt enhanced by Captain Ashton's abiding affair with ships, the sea and his interest in sailing. They have one son, aged 27, a graduate engineer who lives and works in Gloucestershire.

RETIREMENT — CAPTAIN C.R. DOWNES recently retired as Port Met. Officer for London and South-east England, after 20 years with the Met. Office following 24 years sea time with one shipping company.

Clive Downes was born in Exmouth on 18 June 1933 and educated at King Edward VI Grammar School, Retford and De Aston School, Market Rasen. On leaving general education in 1949 he spent two years on the Training ship H.M.S. *Conway* before being apprenticed to the Shaw Savill and Albion Company in 1951. He remained with that company throughout his seagoing career, spending the last eight years in command, having been promoted to Master of the *Cymric* in 1966.

He has reason to remember well that first voyage in command, as within a few days of sailing from Liverpool on 4 November with a general cargo, bound for New Zealand via Curaçao and Panama Canal, his ship ran into what remained of hurricane 'Lois'. His meteorological logbook of the voyage records experiencing south to south-westerly winds of 50 to 60 knots and a confused wave system with wave heights up to 40 feet. For continuing to send three-hourly weather reports to U.S. stations during these extreme conditions when only 2° south of the hurricane centre, he received a letter of commendation from the United States Weather Bureau.

During his time at sea, Captain Downes sent in a total of 22 logs, the first of which came from Shaw Savill's passenger ship *New Australia* in August 1954, when that ship was engaged on immigrant voyages to Australia. Eleven of his logs were assessed as Excellent, and he received an Excellent Award in 1969.

Captain Downes came ashore and was appointed as a Nautical Officer at Met. Office Headquarters in April 1975. For eight years he was Deputy Editor of this journal, at the same time being responsible for the maintenance of Marine Division publications used in the Voluntary Observing Fleet. His name also became familiar to ships' Masters and Officers from the letters of thanks he sent to ships following his assessment of their logs.

In 1983 he was transferred to the senior position of Port Met. Officer based at Grays, near Tilbury, where he has remained up to the time of his retirement in March this year. Much of Captain Downes' work, described in some detail in *Meet the Port Met. Officers* in the October 1993 edition of this journal, consists of liaising with ships and shipping connections and encouraging the continuation of the vital work of weather observing on merchant ships around his sizeable territory, servicing what is probably the largest number of ships and shore stations of the seven U.K. Port Met. Offices, with the assistance of his Scientific Officer.

We wish him happiness and success as he and his wife Margaret remain active in retirement, he as an Anglican church warden and with various hobbies including his model railway, whilst she continues to teach young children from their home in Kent.

Notices to Marine Observers

IMPORTANT NOTICE TO OBSERVERS RE NEW CODE GROUPS

The following notice was issued for distribution to all U.K. observing ships as soon as convenient from December 1994 onwards.

'With immediate effect, all voluntary observers on U.K. VOF ships are requested to adopt the following procedure for entering the new code groups into current editions of the Ship's Meteorological Logbook, mainly for computer recognition purposes:

1. Continue entering the wet-bulb temperature in column 19.

2. Enter new Group 23, Wet Bulb Temperature, down the left hand side of the remarks column and not, repeat not in the ICE Group or any other group columns.

Immediately on receipt of copies of the new edition of the log containing the new code format, expected in early 1995, all ships of the U.K. VOF should bring them into use, closing and forwarding the current log and disposing of any unused out-of-date logs.

Masters and Officers on observing ships are urged to co-operate in this and to ensure they obtain receipt of new logs at the earliest possible opportunity.'

PORT MET. OFFICERS — CHANGE OF ADDRESSES

On 16 February the Port Met. Officer for Northeast England, formerly presiding at Corporation House, Middlesbrough, moved to the following address:

Port Met. Office, Able House, Billingham Reach Industrial Estate, Billingham, Cleveland TS23 1PX. Tel: 01642 560993. Fax: 01642 562170.

The Port Met. Officer for the Bristol Channel, based at Cardiff, was also due to move house in March, but details of his new address were not finalised at the time of going to press.

CHANGE OF UNITED KINGDOM TELEPHONE NUMBERS

The final changeover to the new area codes for United Kingdom telephone numbers is due to take place on 16 April 1995. A summary of the known changes is given below.

Exchange	*Old*		*New*	
	Area	*Number*	*Area*	*Number*
Bristol	0272	xxxxxx	0117	9xx xxxx
Leeds	0532	xxxxxx	0113	2xx xxxx
Leicester	0533	xxxxxx	0116	2xx xxxx
Nottingham	0602	xxxxxx	0115	9xx xxxx
Sheffield	0742	xxxxxx	0114	2xx xxxx
Hull	0482	xxxxx	01482	3xxxxx
Jersey, C.I.	0534	7xxxx	01534	87xxxx
All others	0x1	xxx xxxx	01x1	xxx xxxx
OR	0xxx	xxxx(xx)	01xxx	xxxx(xx)
International	010		00	
Free and mobile etc.	08xx		08xx (no change)	

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